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Editorials.

THE FELLOWSHIP EXAMINATION AND THE NEW PUBLIC HEALTH DIPLOMA.

It has been suggested on several occasions, and the subject was again prominently brought before the Central Veterinary Medical Society recently in a paper read by Professor Woodruff, that the Fellowship Degree was not sought after or obtained by some of the best men in our profession on account of the necessity for a revision of a lot of the work of student days—work which is doubtless of great interest, but not of practical value, to the particular sphere in which their lot has been cast. There is no doubt that there is a good deal of truth in this, and the suggestion that a candidate should select a certain specialized branch in which he should be examined is a good one. It would tend to improve our knowledge very greatly, as concentration of brain effort in certain special lines must of necessity lead to deeper work and keener observation in those subjects.

Take, for example, the work of the man who has specialized in the Public Health Service. For years he will have been out of touch with the ordinary routine of daily practice, and it would be

of the greatest advantage to him to be able to obtain a diploma certifying that he had specialized in public health work. A diploma of this kind would be of much more value than the ordinary Fellowship one as at present existing. The man who has devoted his life to canine work finds it very hard to have to read up cattle pathology, but in order to enter the competition for the Fellowship Degree it is necessary that he shall do so; and facts like these often deter competitors from entering the lists.

Surgery, again, can claim its specialists in veterinary practice as in the human branch; not, of course, to so large an extent, but still sufficiently to cause men to become sufficiently proficient in this branch to be called in as consulting experts by their brother professionals. The most important of all, however, is the Public Health aspect, for this subject is rapidly coming to the front, so much so that at the present moment the necessity for granting a new diploma is before the Council of the Royal College of Veterinary Surgeons.

That the necessity for this is strongly felt by members of the profession is certain, and ample proof is given by the eagerness with which those of our graduates who are intending to enter the Public Service seek the qualifications of the Victoria University, Liverpool University, or even the Royal Sanitary Institute. It is time the College Council awoke to this fact, as another Midland University is already on the move, and it is certain that others will follow, thus giving a mixture of post-graduate degrees or diplomas of which the standard cannot possibly be constant.

If it is impossible to so alter the Fellowship Diploma that no direct clause can be inserted to assist applicants for Public Health posts, then the institution of a new Diploma in Public Health, as suggested by Professor Williams, is a necessity—*i.e.*, if the Council of the Royal College of Veterinary Surgeons are to retain a firm grip (which is so desirable) over the whole of the affairs of the members of the profession.

Once allow the best men of the profession to become graduates of other bodies, and we shall find that their allegiance will become divided, and even although the M.R.C.V.S. Diploma is a great essential, the feeling in the profession is very strong that we ought not to be compelled to go outside the profession itself for an extra

degree which will be acceptable to the borough councils and other public bodies who have the power to make and sanction veterinary Public Health appointments. At the present time it is, unfortunately, an open secret that men holding a medical diploma or a sanitary qualification are selected for work which legitimately belongs to us, and which might be secured quite readily by those of our men who possess an authorized Veterinary Public Health Degree. The time has long been ripe and if neglected much longer will pass by. It is high time the Council seriously took it up, and Professor Woodruff is wise to urge the movement forward as speedily and emphatically as possible.

THE HAGUE CONGRESS.

ON a subsequent page we publish some brief particulars of the forthcoming International Veterinary Congress, to be held at The Hague, and to all who can arrange for a week's absence in September there is no more pleasant or profitable holiday to be obtained anywhere. To visit Holland under such auspices as are held out by the presence of the Congress will be ideal, and those who compose the English party will meet with every courtesy and kindness from the officials. Interpreters will be provided, the speeches being translated into German, French, and English, and there will be opportunities such as one can get nowhere else to interchange courtesies and get ideas with foreign colleagues whose names are known world-wide.

The expenses of the trip compare very favourably, as will be seen by perusing the time table, with a holiday of like character in England, and the change of scene, of language, and even of dietary, makes a holiday of only a week in a foreign country give a benefit equal to fully a month in England. Those who intend to go should send in their names early, as the best hotels are sure to fill up quickly, and difficulty may be experienced by the tardy ones in obtaining rooms for a party of friends together.

If the Buda Pesth Congress can be taken at all as a type

of what is done for the visitors, the Hague Congress will be an assured success; and we must not forget, too, as an additional stimulus to take part in this particular assembly, that our hosts of to-day will be our guests of to-morrow, for London has been selected as the centre for the next meeting, to be held in four years' time.

REMOVAL OF A NAME FROM THE REGISTER.

IN our correspondence column is to be found a letter from Mr. Robert Dunstan concerning our suggestion made in the VETERINARY JOURNAL for May for a new method of procedure for the above. It is hardly necessary for us to review the circumstances that prompted us to make the suggestion, which has been grasped and clearly reviewed by Mr. Dunstan. We are fully aware that at the present time the Council of the Royal College of Veterinary Surgeons has no power to adopt those suggestions. However, we felt constrained to point out a method by which the work of the Registration Committee could be simplified and justice meted out, and which would avoid such an undesirable contingency as that which caused us to refer to the matter. If the Council of the Royal College of Veterinary Surgeons thought desirable, no doubt it could obtain the necessary powers for an alteration of procedure as suggested.

General Articles.

TETANUS.

BY J. D. WHITEHEAD, F.R.C.V.S., SALFORD.

A SPECIFIC infective disease due to the *Bacillus tetani*. This disease chiefly affects the horse, more rarely the sheep and goat; the ox is not often affected; the disease is not frequent in man, and the fowl is very resistant. The disease is seen all over the world, more often in tropical countries, and in this country it is comparatively common in certain districts and more frequent in other parts. The effects of the specific organism are seen in a highly excitable condition of the nerve centres, and a more or less complete contraction of all the voluntary muscles, and in the later stages the involuntary muscles may also be affected.

In the past two forms were recognized, viz., traumatic and idiopathic; traumatic being where a wound was present, either accidental or operative. Idiopathic being those cases where no wound was to be seen, and these cases were believed to be due to cold and wet, or chills, &c., but these distinctions are now things of the past, as we know that in all cases of tetanus there must be a wound for the entrance of the causal organism. It is quite possible that the wound may be quite a small one and easily overlooked, or it may be a wound of a mucous membrane.

The causal organism was discovered in 1885 by Nicolaier, and is a short bacillus 3 to 5 μ in length, with rounded ends; it usually occurs singly, but may be in long filaments in cultures. The bacillus is motile and has many flagellæ, and it is a spore-forming organism. The spore is terminal, and is greater in diameter than the bacillus, hence the term the "drum-stick bacillus." The bacillus differs from many other organisms in that it retains its motility after spore formation has taken place. The bacillus stains with all ordinary basic dyes, and also by Gram's method, the spore being seen as a clear, round, unstained body, at the end of the organism. It is an anaerobe, and can be cultivated at either room or body temperature. At the higher temperature in agar media it grows best in the deeper parts of the nutrient media, and gives off lateral offshoots from the needle tract. It liquefies gelatine, and in either media it gives off gas which splits up the media and has a peculiar odour. The bacillus and its spores have been found in manure, garden soil, street sweepings, and in the intestinal canal of the horse; and it is probable that the tetanus bacillus exists frequently and abundantly in the intestinal tract of equines, and that its spores are passed out with the fæces, and so make manure and garden soil, &c., infective.

The tetanus bacillus is therefore a saprophytic organism, but when it obtains an entrance into the animal body in a suitable place for growth it is a facultative parasite. Infective material is thus anything which contains the tetanus bacillus or its spore. The bacillus or its spores usually enter through a skin wound, but it is not sufficient if it is only a skin wound. The bacillus to multiply must be under anaerobic conditions; therefore a deep punctured wound or pocket in the skin are the most likely wounds to be followed by tetanus.

Experimentally it has been found that the introduction into the tissues of the tetanus bacillus or spores will not set up the disease; but if they are introduced along with other bacilli they will probably cause the disease. The explanation given is that when introduced by themselves they are ingested by the phagocytes before they have time to multiply, but when accompanied by other bacteria these latter are warred against by the phagocytes, and the tetanus bacilli are thus given a chance to multiply and produce their toxins.

The tetanus bacilli remain localized at the place where they enter the body, and do not pass into the blood-stream. The bacilli produce a toxin, and this toxin is absorbed, and therefore the symptoms are due to an intoxication. It appears probable that the toxin is carried away by the lymphatic channels which are associated with the peripheral nerves of the infected part.

The period which elapses between the time of infection and the first signs of the disease is termed the incubative period, and this varies in different animals, but in the horse is usually put down at from three to seven days, but in less susceptible animals it may be weeks. No symptoms are shown until the toxin has combined with the nerve cells, and this toxin acts on the motor centres in the spinal cord, and having become fixed it interferes with the action of these cells, and their energy is liberated in an abnormal manner, causing tonic spasms of the muscles. The toxin has no direct action on the muscles themselves. The tetanus toxin is very violent, being one of the most powerful bacterial poisons.

Symptoms.—The onset of the symptoms is gradual in some cases, the first signs noted by the owner are that the animal seems nervous and more easily excited, and a stiffness in its gait. Or the first symptoms noticed may be a difficulty in mastication, and some elevation and stiffness of the tail.

These symptoms increase, and in a few days, in a moderately severe case, all the muscles of the head and neck may be affected, and there is a poking of the nose, dilatation of the nostrils, the masseter muscles are hard, and the cheeks seem full. Saliva collects about the angles of the mouth, and on raising the head the eyes are retracted within their orbits, and the membrana nictitans is projected over the eyeball. There is now some dysphagia, but the appetite remains. The animal stands stiffly, with all four legs propped out, and when it moves the limbs seem to be moved as if all in one piece and without joints. The tail is elevated, and the muscles of the back and loins are hard. Respirations are quickened, there is usually constipation, and the animal is easily excited, a shout or bang of the door being sufficient to cause a sudden increase in the severity of the symptoms; and it is during these sudden increases of the spasms that the animal often falls to the ground and is unable to rise again, and struggles until death occurs. It is the suddenness of the noise which causes the increase of symptoms, not the actual noise itself, as, if an affected animal can see the actual cause of the noise and is prepared for it, the noise has not got such a disastrous effect.

As disease progresses the symptoms get more severe, but the patient may still attempt to eat—collects hay in his mouth, but cannot swallow it, and cannot open the mouth to eject it again.

During the course of the disease there is a marked thirst; but in

bad cases, although he may plunge his muzzle into a bucket of water, he has very great difficulty in swallowing. The mouth gets fetid and foul, and strings of dirty saliva hang from the lips; the eyes become sore, and often the cornea is cloudy. All the muscles of the body become affected, including the muscles of the chest and abdominal walls, and there is great difficulty in breathing, which is short and very frequent. The pulse is quick and hard, and also there is difficulty in defæcation and micturition. The animal seems quite sensible throughout the disease, as the brain does not appear to be affected. Generally there is some congestion of the lungs or broncho-pneumonia before death, and this may be due to food and water passing down the trachea during a fit of coughing excited by the difficulty in swallowing.

Diagnosis is made by the spasm of the muscles, the projection of the membrana nictitans, and often the history of a wound and the gradual onset of the symptoms. There is a great difference in the severity of the symptoms in different cases. Some are so acute as to appear hopeless from the onset; others are comparatively mild, and when occurring in young animals it is usually fatal. The disease often runs a course of about three or four weeks, but complete recovery is often much longer, and may extend to three months. Few die after three weeks, and if a case can be nursed through the first fourteen days great hope of recovery may be entertained. The mortality has been put as high as 70 per cent., but except in young animals about 50 per cent. recover. In the sheep and goat very few cases recover.

Therapeutic Treatment.—Medicine plays a secondary part in the treatment of this disease. Good nursing, dietetics, and hygiene are essential for success. The patient is to be put in a roomy, well-ventilated loose-box, with a good light, although it should be shaded from the direct rays of the sun. The patient's head should be turned towards the door, so that the animal can see the attendant entering, and is thus aware of all that is going on, and the chance of being startled is thus greatly diminished. In all cases, whenever possible, the patient ought to be placed in slings. A temporary manger must be provided and placed in front of the patient at a convenient height, and if a bucket of clean, fresh, cold water is kept constantly before the animal he can then quench his thirst at frequent intervals, and does not depend on the coming of the attendant; food to be given in small quantities. Anything which the animal can eat may be given—gruels, mashes, grass, if obtainable, &c.

Good ventilation of the sick-box is very necessary, as owing to the difficulty in respiration it is requisite that pure air be available, so that a full supply of oxygen can be got at each inspiration. Darkness was at one time insisted on, but light is not in opposition to quietness. Bedding ought to be short, and many use chopped straw or sawdust; but if short it does not impede the animal's attempts at movement, and is also easier to clean out.

When first seen, it is the usual, and probably best, plan to give the patient a dose of purgative medicine, in order to empty the bowels of any excess of solid excreta, because, owing to the difficulty in defæcation when the symptoms are more pronounced, if the bowels are full of excreta a fermentation goes on, the poisonous products of which may become absorbed, and these would not aid the patient's chance of recovery.

Many drugs of a sedative character have been used in the treatment of this disease, examples of these being morphia, atropine, opium, belladonna, chloral, bromides of potassium and sodium, hydrocyanic acid, and in the hands of different practitioners have all proved of benefit, but probably in most cases the skill of the practitioner has surpassed the efficacy of the drug.

Belladonna is often given in the form of electuary, but the benefit is very doubtful: electuary is not easy to give in a case of tetanus—it leaves a taste in the patient's mouth which probably interferes with his feeding, a matter of great importance where it is necessary to encourage the animal to take nourishment, and, in addition, the quantity of belladonna which dribbles from the patient's mouth in the saliva is probably far more than what is swallowed. Many recommend giving medicines with the food, and where the animal will take them it certainly does no harm, but it is better to sacrifice the giving of medicines to the interference with and loss of appetite.

Hypodermic injections are good. If an injection of morphine and atropine be given and a good mash be placed before the animal at the same time the spasm seems to be relaxed, and often the mash will be eaten before the next visit is made. These hypodermic injections may and often do increase the excitability of the patient; but if after the injection the patient is left severely alone and free from any sudden alarm, no untoward result will be apprehended. Stimulants to the spine and the giving of strychnine have also been tried, but neither treatment can be recommended. The animal's eyes need attention, but cleanliness with the use of a mild antiseptic lotion are all that are necessary, and any opacity of the cornea usually clears up when recovery occurs.

If a wound is present it should be carefully attended to; thoroughly cleaned and disinfected. It should be irrigated with an antiseptic solution and all foreign materials washed out, and then it should be treated with an efficient disinfectant, *e.g.*, tincture of iodine.

Serum Treatment.—The production of antitetanic serum is rather a long process. Briefly, it is as follows: A horse is actively immunized against tetanus, and for this purpose use a filtered culture of the tetanus bacillus in bouillon. This filtrate does not contain any bacilli but only the toxins, and this is used as the stock material. This is divided into several portions: to one portion nothing is added; to the other portions some chemical substance is added, *e.g.*, iodine or terchloride of iodine, which will reduce the virulence of the toxins, and this chemical substance is added in different varying quantities to the different portions of the original stock material, and thus obtain a series of materials with a gradual decrease in virulence.

When commencing to immunize the selected subject, commence with the least virulent material and give a small dose; eight days later give a larger dose of the same material, and repeat this dose a week later. The same procedure is adopted with the other portions, until at the end one can inject a large dose of the original stock material. During this process the animal after each of these injections has a feverish reaction; if, when fully immunized, the animal is bled with aseptic precautions, the blood serum contains an antitoxin to tetanus. The sera obtained in this manner have varying powers of conveying

passive immunity, so that in actual practice they are standardized before being put on the market.

The cause of the antagonism of the antitoxin to the toxins of tetanus is *not* to be regarded as a direct action of the antitoxin on the toxin, or as a physiological antagonism, but it is believed the antitoxin combines with the toxin and renders the latter inert. As a curative agent the antitoxic serum must therefore be used early; in practice it is of much greater value as a prophylactic agent in cases of punctured or other wounds which are contaminated with earth or manure, &c., especially in districts where tetanus is a common disease.

After a natural infection it is often several days before symptoms of the disease are shown, and during this interval the toxin has had time to combine with and become fixed in the nerve cells, so that the probable benefit of injecting antitetanic serum in a clinical case of tetanus is very doubtful. However, if toxin is being elaborated at the site of infection at the time when the injection is made, probably the antitoxin will combine with it, and thus render the case less serious. In all cases where it is decided to try the effect of antitetanic serum after symptoms of tetanus have appeared, a huge dose should be given—many times the dose which would act as a prophylactic—no ill-effects need be feared from an overdose.

As a preventative, all wounds, especially punctured wounds, should be treated with efficient antiseptics, and in districts where tetanus is common, the early use of antitetanic serum should be practised.

CATARRHAL FEVER OF SHEEP—BLUETONGUE.

BY R. W. DIXON, M.R.C.V.S., CAPE COLONY.

THIS is a specific disease which affects sheep over a large area of South Africa. It is characterized by high fever, a catarrhal inflammatory condition of the mucous membranes of the mouth, lips, tongue, upper air passage and intestines, very often accompanied with inflammation of the laminæ of the feet and coronary band, followed in some cases by suppuration and shedding of the hoof, and also shedding of the fleece. The lips, cheeks, and tongue become greatly swollen, the latter assuming a purple colour from discoloration of the lining membrane, hence the term applied to this disease, "Bluetongue."

Originating Cause.—Veterinary Surgeon Spreull in 1901-02 carried out a number of valuable and comprehensive experiments respecting this disease, and his observations and conclusions have been in most instances substantiated by Dr. Theiler, Government Veterinary Bacteriologist of the Transvaal, who carried out further experiments in 1904-05 to see whether the disease in the Transvaal was identical with that found in this Colony.

Bluetongue is not a contagious disease (affected sheep have been kept in intimate contact with healthy susceptible sheep with no ill-effects), but is readily communicable by inoculation with a small dose of blood taken from an affected animal either subcutaneously or intravenously, and is due to a micro-organism. So far all attempts to find the organism both by microscopical and bacteriological

means have failed. It has been found that the blood of a sick sheep when passed through a Berkefeld filter retains its virulence. All visible micro-organisms would be unable to pass through such a filter, consequently the conclusion is formed that the organism of this disease must be so small as to be non-visible under the highest power of our microscopes.

The disease is very much more prevalent in this Colony in some years than in others. In very dry seasons it is much less prevalent, and is mainly confined to the low-lying districts, whereas in seasons in which there has been an abundance of rain it prevails over a large area of the country. Under warm and moist conditions the disease may appear as early as December or even November, but February to April are the months in which we find the disease most general. It is very rarely met with in mountain veld, being usually confined to the valleys and plains. It is the local elevation, however, which gives the protection, not as elevation above sea level, but as compared with the surrounding country. We find that if sheep are kraaled before sunset on the top of high, elevated portions of the farm or placed in proper sheds during the night, this malady can be prevented. Further, if a flock of sheep in which the disease is prevalent is dipped in some sheep dips, more especially the carbolic or tar derivative dips, the spread of this disease can be arrested. Unless the weather is very rainy, so as to wash out the dip from the fleece, it is found that these dippings protect the animal for about one month.

It has long been suspected that the disease is contracted and spread under natural conditions by the agency of flying insects, probably mosquitoes. We have no positive proof of this yet, but the negative evidence produced is so strong as to justify these suspicions. The principal facts brought forward to prove the agency of flying insects in the production of the disease are :—

(1) Bluetongue can be produced artificially only by inoculation. All attempts to produce the disease by drenching with virulent material have failed.

(2) By shedding and dipping the disease can be prevented by protecting the sheep from the attack of insects; on the other hand, shearing sheep when the disease is prevalent is apt to increase the chances of infection.

(3) The disease is not contracted during the day but at night time.

(4) The disease is more prevalent in low-lying marshy districts, where night insects such as mosquitoes are most numerous, and during the season of the year when such insects are most active.

Symptoms.—The period of incubation varies from two to four days from inoculation ; under natural conditions it is not yet determined, but is probably about the same time as when produced by inoculation. The temperature is high at the onset of the disease, reaching from 104° F. to 107° F., the fever period extending from five to seven days, there being a marked drop when the eruption about the mouth appears.

One of the first symptoms noticed is a frothing from the mouth and licking of the lips. If caught and examined it will be found that the mucous membrane of the mouth is inflamed, showing a purplish blue discoloration with swelling of the gums and lips. In very severe

cases the tongue becomes badly swollen, of a dark blue colour, and sore from shedding of the epithelium.

There is sometimes an œdematous swelling of the lower part of the face and the space between the lower jaw-bones. When the mouth sores are healing and the appetite returns, it will be seen that the affected animal is walking lame and tenderly. Examination of the feet shows great heat and tenderness with a bluish-red line round the coronets. In some outbreaks I have noticed that some sheep in the flock would have the lesions in the mouth badly without lameness, in others the only symptoms noticeable were acute tenderness and inflammation of the feet with lameness. During the febrile stage when the mouth is sore there is great thirst, and if the affected sheep are then allowed to drink large quantities of water this sometimes produces vomiting.

The fatal cases are usually amongst young animals when poor in condition, they often develop symptoms of diarrhœa and severe emaciation. A fatal symptom is when the neck becomes twisted (wry neck). In cases of recovery the whole course of the disease is about twenty-one days.

The mortality in this Colony is fortunately not severe, probably not more than 10 per cent. of the cases end fatally, but the indirect loss from wasted condition and shedding of the fleece is often much greater than the direct loss from deaths. Sometimes heavy mortality does occur from blue-tongue in some districts, and it would appear that a difference in the virulency of the infection exists in certain districts at certain seasons.

Post-mortem Appearances.—As a rule death supervenes from debility and extreme emaciation, the lesions in the mouth in most cases have already healed, but the flesh and organs are found pale and nearly bloodless. In acute cases the tongue is more or less stripped of its epithelium lining, and may be found gangrenous at its tip, the dental pad and inner surfaces of the lips are raw and sore. The rumen often shows inflamed patches. The contents of the third stomach are usually found liquid, but the fourth stomach is very frequently much inflamed, in severe cases the membrane being swollen, of a purple colour, with small ulcers or erosions near the exit. The small intestines may also be found inflamed, more especially when the disease is complicated by diarrhœa, in which case the large intestines may be found more or less affected. The spleen is enlarged, and the pulp slightly softened. The liver is usually congested, and the gall-bladder full of dark-green bile. The kidneys are also congested and œdematous, the covering membrane being easily stripped off. The lungs are usually normal, except in cases where there is œdema and frothy mucus found in the trachea and bronchial tubes. The blood is unaltered in appearance and well coagulated. A little yellow fluid is found in the pericardial sac, and there is also to be found petechia (blood markings) on the endocardium of the left ventricle of the heart.

Susceptibility.—This varies greatly. The pure Merino is most susceptible, especially when young. Africander and Persian sheep seem to have a considerable degree of immunity. Both old and young are liable to attack, but it is found that sheep 1 or 2 years old contract the disease most severely. It is noticed that young lambs unweaned escape. The blood and also the serum of the blood of an affected

sheep is virulent during the whole course of the fever and for a considerable number of days after recovery. Blood obtained from a severe case fifty days after the fall of fever on intravenous injection produced a typical sickness. (Spreull.)

Preventive Inoculation.—Spreull was the first to show that susceptible sheep could be immunized by inoculation. He found that the serum of the blood of a sheep which has recovered from an attack of bluetongue has strong protective properties, and that by the repeated injection of virulent sheep blood into recovered sheep he was able to produce a strong preventive serum. It was found also that the virulent blood, either citrated or defibrinated, preferably the latter, can be preserved by the addition of carbolic acid and glycerine, and the mixture remains infective for several months. A sheep, inoculated by Spreull with blood preserved for a hundred and five days, became acutely fevered, and its blood produced a typical form of the disease when inoculated into a fresh animal.

Spreull's Method.—Two vaccines are employed, viz., one of blood and one of serum. The dose of the blood is 2 cc., the dose of serum is 4 cc. He recommends that the vaccines be mixed immediately before use and to inject a 6 cc. dose of the mixture.

Effects of the Inoculation.—From the eighth to the tenth day a few will show redness of the mouth, and later some will show slight tenderness of the feet; but when the serum is strong very few sheep will show such symptoms. This inoculation has been found useful in stopping outbreaks in infected flocks. (Spreull.) The best season for this inoculation is from October to December.

Theiler's Method of Preventive Inoculation.—Dr. Theiler, Government Bacteriologist, Transvaal, who took up the investigation of this disease in 1904, found, when conducting experiments in his laboratory, that after passing the virus through several generations of sheep, the mortality after inoculation completely ceased, this cessation occurring after the tenth generation. He found that from the first to tenth generation out of ninety-nine sheep inoculated ten died, and from the eleventh to thirty-third generation out of 897 inoculated none died, and that the immunity conferred from inoculation with this modified virus was equal to that obtained by veld infection. These results induced him to abandon the simultaneous method of serum and virulent blood inoculation and introduce the vaccination with attenuated virulent blood.

Up to February, 1908, over 80,000 doses of bluetongue vaccine had been issued to the Transvaal farmers, whilst over 100,000 doses were distributed among the other South African Colonies, and the results of the vaccine have proved eminently satisfactory ("Annual Report, Transvaal Veterinary Bacteriologist," 1907-08).

The only complaint that can be brought against the vaccine would appear to be that the vaccinated sheep become reduced in condition, but I consider it can now be safely said of this method of vaccination that by producing a mild form of the disease without severe loss of condition, it is capable of protecting sheep sufficiently to allow them to withstand natural infection. The immunity acquired both by this method of inoculation and also natural infection seems to protect for at least twelve months. The advantage this vaccine has over Spreull's method is that it is easier and less expensive to produce.

Watkins Pitchford Preventive Inoculation. — Recently Mr. Watkins Pitchford, F.R.C.V.S., F.R.S.E., Government Bacteriologist, Natal, has introduced another method of inoculation much on the lines of that recommended by Theiler, but differing in the method of attenuating the virus. His method is to subject the virus to a temperature above that which is encountered in the body of the sheep during the high fever.

"The blood is drawn from sick sheep under aseptic conditions, is collected and defibrinated without contact to air. The virulent blood is then submitted in a specially arranged incubator to a temperature from 112° F. to 117° F. for a length of time, and it was found that by adjusting this exposure the degree of virulence could be controlled almost to the point of extinction." ("Report on Sheep Disease known as Bluetongue," Watkins Pitchford.)

As far as is publicly known, this method is still in the experimental stage. Mr. Watkins Pitchford hopes this season to extend his field of experiments in order to watch the results of a wider application of his vaccine.

Curative Treatment.—Many remedies have been tried and recommended, but as the mortality in most outbreaks in the Colony does not exceed 10 per cent. of the affected animals and the remainder recover without medicinal treatment, it is advisable not to disturb or distress the sick sheep by continual dosing.

The mouth lesions may be treated with some weak antiseptic and astringent solution such as alum or chlorate of potash, or a mixture of Stockholm tar and sulphur, one teaspoonful each may be given, also doses of carbolic or tar derivative sheep dips.

I have found the following mixture beneficial: Carbolic sheep dip, such as Little's, Quibell's, or McDougall's, one teaspoonful; raw linseed oil, one wineglassful, mixed. This dose can be repeated if found necessary. The patient should be placed under cover or in a cool shaded place, and disturbed as little as possible. If there are no sheds, the sick sheep should be picked out of the flocks as soon as they are noticed sick, and placed in paddocks or a sheltered spot near the homestead where they will not be disturbed.

Allow them a free access to a lick of common salt, which they appear to like and take readily.

(*Agricultural Journal of the Cape of Good Hope.*)

THE NURSING OF SICK ANIMALS.

BY J. M. CHRISTY, ASSISTANT PRINCIPAL VETERINARY SURGEON, TRANSVAAL.

Too much attention cannot be given to this subject. My experience is that owners are far too liable to place implicit faith in medicinal remedies, and are either ignorant of how to nurse their patients through serious attacks of illness or are too negligent to do so. Proper medicines intelligently administered play a most important part in combating all forms of disease, but to be successful they must be backed up by good nursing. We have all heard well-intentioned but ignorant people extolling the medicinal virtues of anti-friction grease, paraffin oil, and

gunpowder, but seldom hear them speaking enthusiastically about nursing, which is a troublesome thing, calling for energy and patience.

The most important duties of anyone in charge of sick animals is to see that his patients are made as comfortable as circumstances will admit, that proper food only, and at regular intervals, is given, and that any medicine prescribed is administered exactly according to instructions. I do not assume to dictate to any man, but a quarter of a century's experience in dealing with sick animals has impressed forcibly on me the good results following careful, intelligent nursing, as opposed to indiscriminate administration of drugs, each of which is supposed to be a specific for the particular trouble for which it is given. There are few specific remedies for any of the many ills the animal body is heir to. The bodies of all animals undergo disintegration and waste, and their growth and repair require continual recuperation. By digestion and assimilation the food materials are prepared for their special uses, and build up or maintain the body at its normal standard. In health, food must be provided in sufficient amount, of suitable quality, and with its several constituents in fitting proportion to furnish nutriment for every tissue. Water, which constitutes four-fifths of the total weight of most animals, is being constantly removed by the lungs, skin, kidneys, and intestines, and, unless, restored at short intervals, thirst and impared health ensue. Not only are water and watery fluids requisite for the normal nutrition of the tissues, and for dissolving and carrying away their waste products, but in sick animals they also assist the removal of the products of disease.

Even more imperative is the need of pure air to oxygenate the blood, maintain internal respiration and normal tissue change, and remove waste products. These requirements, essential in health, are even more important in animals affected by disease. Food, then, requires to be given with especial care, and in an easily digested form, for in all serious diseases the digestive functions are impaired. In many febrile complaints the ordinary foods being imperfectly digested and assimilated are apt to produce or aggravate gastric derangement. Animals suffering from febrile and inflammatory disorders should therefore be restricted to easily digested foods, such as mashes, gruels, &c., given at short intervals, to which extra nutritive value can be given, as required, by addition of milk, eggs, or meat extract. Food should never be allowed to lie long before a sick animal. If not promptly eaten, it should be removed, and in a couple of hours or less time replaced by a fresh supply. During and after attacks of debilitating diseases, patients fed, as they should be, on small quantities of rapidly digested fare obviously require food more frequently than in health. With returning appetite a convalescent occasionally greedily eats more than can be easily digested, and against this contingency well-intentioned attendants require to be warned. Relapses of stomach and bowel troubles sometimes occur by allowing animals, immediately after recovery, their full allowance of food.

There are few diseases, if any, in which animals injure themselves by taking too much water or watery fluids, but they are often rendered uncomfortable and injured by undue restriction. A supply of water should always be within the patient's reach. Cold water seldom does harm, and is more palatable and refreshing than when tepid.

In towns, particularly, much mismanagement occurs with regard

to the ventilation and temperature of the habitations of sick animals. Draughts should be avoided, but cool air should be freely admitted, and the stable, kennel, &c., kept scrupulously clean, No restorative or tonic is so effectual as cool, pure air, and it is especially needful in diseases of the respiratory organs, or of a lowering or wasting nature, such as influenza in horses and distemper in dogs.

Sunlight is also an essential factor in the promotion of health, especially in the young. It increases the capacity of the blood and tissues for oxygen, favours healthy excretion, and is an excellent disinfectant. In the Transvaal it would be undesirable to allow the direct rays of the sun to play for any length of time on a sick animal; if a suitable stable or shed is not convenient, a shade of some kind should be improvised.

A comfortable bed greatly conduces to the restoration of most sick animals. A sick, exhausted horse, who to his disadvantage would continue to stand if kept in a stall, will often at once lie down and rest if placed in a comfortable box or nice shady place with a proper bed. In febrile and inflammatory attacks, and during recovery from exhausting diseases, it is desirable to conserve the bodily heat. For this purpose a warm rug or two, and bandages to the legs, do good. They help to maintain equable temperature and combat congestion of internal organs, but at least twice daily these rugs and bandages should be removed, the skin wisped over, and the clothing at once replaced.

Attention to the position of the patient is frequently important, and must be seen to; thus a horse allowed to lie for any great length of time on one side is liable to suffer from congestion of the lung on the under side; cattle when very sick, if allowed to occupy the same recumbent position for any length of time are liable to become tympanitic, and their chance of recovery is thereby seriously impaired. Sick animals should never be allowed to lie prone in any one position for a long period; turn them over occasionally, and hand-rub the parts they have been lying on; this will assist local and general circulation, and contribute materially to their general comfort and ultimate recovery. The feeding of sick and convalescent animals is of the greatest importance; the guides are, give nothing difficult to digest, tempt the appetite, but do not overload the digestive tract.

To sum up, in dealing with sick animals we should use our common sense, which dictates that we should pay particular attention to the patient's general comfort, his dieting and watering, and only administer medicinal remedies whose action we understand, or that from previous experience we know to be beneficial in the particular trouble with which we have to contend.

(*Transvaal Agricultural Journal.*)

EQUINE BILIARY FEVER.

(*Pyroplasmosis equi*).

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Definition.

A SPECIFIC febrile affection of the horse, mule, and donkey, due to the invasion of the red corpuscles of the blood by a protozoal parasite known as the *Pyroplasma equi*.

Geographical Distribution.

The disease is very common in North and South Africa, and India, where it occasions considerable losses. It is also comparatively common in Southern Europe, Egypt, and the Soudan, and has been observed in Sicily, Algiers, Tonkin, Madagascar, Senegal, Cochin China, and the Philippines. No cases have been detected in England or Northern Europe [1]. Its occurrence has, further, been recently reported in Russia. (*Veterinary Record*, January 2, 1909.)

History and Etiology.

The disease named biliary, or bilious, fever, and occasionally termed equine typhoid, or typhus, or remittent or petechial fever of the horse, has been known to exist in the countries in which it occurs for an indefinite period, but it is only within comparatively recent years that its true nature became known. In South Africa it used to be generally confounded with "horse-sickness."

According to McFadyean [2] it was originally identified as a parasitic disease, and described as equine malaria in Italy, but there seems little doubt but that our thanks are principally due to Dr. Theiler, Government Veterinary Bacteriologist, South Africa, for the first accurate description of the hæmatozoon which is the cause of the disease, and for practically the whole of the present state of our knowledge on the subject, at any rate in the English language.

The first important communication on the disease by this investigator appeared in Part I. of the *Journal of Comparative Pathology and Therapeutics*, 1902. Prior to this the true pathology of the disease was quite unknown to the majority of English veterinarians, its parasitic nature was entirely unthought of, and it was surmised that the affection was some kind of "liver complaint," that it had some obscure and probably dietetic or climatic origin, and that it was brought about by over-feeding, chills, exposure, &c.

In India the disease did not appear to engage that amount of enquiry and attention that it deserved, and an erroneous idea as to its nature was still held by a large proportion of veterinarians in that country even for several years after the publication of Theiler's investigations; and it would seem that Lieutenant (now Captain) F. S. Pallin, A.V.C., in the *Veterinary Journal* of January, 1905, was amongst the first to draw attention to the identity of biliary fever in India with Theiler's "equine pyroplasmosis" in South Africa, and it is only within the last two or three years that this identity has become generally recognized and admitted throughout India.

Description of the Causal Organism.

The *P. equi*, in common with all other known pyroplasmata, is a genus of the order *Hæmosporidia*, that is to say, a unicellular protozoal organism whose habitat is the red cells of the blood, to which it is conveyed from one animal to another through the medium of ticks, and, so far as is definitely known, of ticks only.

Theiler originally thought that the equine pyroplasm belonged to another genus of the *Hæmosporidia*, namely, that it was a plasmodium, and indistinguishable from the causal parasite of human malaria, and he named the disease "equine malaria," but he subsequently discovered that this view was wrong and that the equine germ differed from the latter in two essential respects: (1) in having no apparent sexual method of multiplication, and (2) in that no pigment was elaborated by it [12]. Also, so far as is known, the intermediary agent in propagating the disease is a tick and not an insect [2].

Staining Reactions.

The organisms will stain with the ordinary basic aniline dyes, but with such staining they appear as amorphous and structureless bodies, and their true nature cannot be determined. Their presence, however, even with these simple stains, can be readily made out under the higher powers of the microscope ($\frac{1}{12}$ oil immersion lens), when they appear as minute, irregular-shaped bodies situated within the red corpuscles. In size the *P. equi* is intermediate between the *P. begeminum* and *P. parvum* of cattle, being about 1 to 3 μ in its longest diameter.

The organisms can also be detected in unstained preparations, but for all practical purposes some modification of the Romanowski method, such as Leishman's or Giemsa's stain, is almost universally employed, and of these the latter probably gives the best results [2]. By this (Giemsa) method, the pyroplasm in a well-stained preparation is seen to be composed (*a*) of a body substance or cytoplasm, and (*b*) of chromatin. The corpuscles themselves are of a pink or eosin tint; the body-substance of the pyroplasm a light blue, the centre being usually of a paler shade of blue, and in the great majority of cases there is also a greater or smaller area which is quite unstained and has a vacuole-like appearance. In the spherical or signet-ring forms this unstained area constitutes the main part of the pyroplasm, and appears to be surrounded by a thinnish envelope of blue-stained cytoplasm, within which the chromatin is situated. The latter generally appears in the form of one or more "masses," usually embedded within the cytoplasm, but occasionally projecting more or less freely from the surface of the parasite [2].

As in the other pyroplasmoses, the equine pyroplasmata exhibit a great variety of shapes, the majority being either spherical or ovoid, or ring or sausage-shaped. Other forms, such as flask, spindle, or cigar-shaped, may be seen, whilst the typical pear-shape is exceptional. On the other hand, the so-called cruciform arrangement of the pyroplasm, a few examples of which are nearly always seen when the organisms are at all numerous, is somewhat characteristic of the equine disease. In this, four leaf-shaped pyroplasms radiate at equal distances from the centre of the corpuscle, their narrow ends being directed inwards [2].

Nothing very definite is known as to the method of multiplication of the pyroplasmata in any species of animal. No sexual multiplication, such as has been shown to occur in the *plasmodiæ* and other genera of the *Hæmosporidia*, has ever been established, and from the observations of Nuttall and Graham-Smith in the case of the canine disease (*Journal of Comparative Pathology and Therapeutics*, vol. xx., p. 165), it seems that a complicated process of division is the method adopted by this organism, which is perhaps accountable for the great variety of shapes in which it is to be seen.

Free pyroplasmata may be occasionally found in the blood plasma, though this is less common in the horse than in the canine and bovine varieties of the disease.

The number of corpuscles invaded in equine pyroplasmosis is comparatively low. The greatest proportion is shown in fatal cases. In these, 20 per cent. of invaded cells is rarely exceeded, whereas in the canine disease the organism may be found in almost every remaining corpuscle shortly before death, and in African coast fever (*P. parvum*) 90 per cent. is by no means uncommon [2].

The parasite is said to be motile, and its movements may sometimes be so active as to lead one to suppose that it possesses flagella; but if so, they are unstainable and too delicate to be visible (McFadyean) [2].

Prevalence and Occurrence. Influence of Locality and Time of Year.

Theiler, referring to the disease in South Africa [3], says: "As a rule, the disease attacks only single individuals, but it may appear in the epizootic form when there are large numbers of susceptible horses. . . . It would appear that certain telluric and climatic conditions are also necessary for the development of the disease." (What these conditions are is not stated). "In Cape Colony cases occasionally occur everywhere and at all seasons of the year, and in certain low-lying farms shut in by high hills it prevails as an enzootic. It is seen in the Transvaal both on the high and low veldt, almost always in summer, especially before the rainy season, but also after that."

According to this observer, rain has no influence on the disease, though Captain Williams, A.V.C., found the disease especially prevalent in a year of heavy rains at Rajputana, India [4]. In the present writer's experience of the disease in India, it was about equally prevalent both during the "monsoon" and the hot weather immediately preceding it, whilst cases were also seen, though less commonly. during the cold season, and, in fact, all the year. In 1906 it was particularly prevalent from April to August at Meerut, in the United Provinces, where there were thirty-one admissions for biliary fever recorded out of about 800 horses during this period. The subjects were all Australian horses. There was also a somewhat high mortality in this "outbreak," twelve deaths (or over 38 per cent.) having occurred, showing that the view expressed by Pallin and sundry other writers, that the disease is of a benign nature, having a low death-rate and a general tendency towards recovery, does not always hold good.

A striking circumstance concerning these cases is that they were all confined to one end of the station (the "Artillery Lines"), whilst

other groups of horses, consisting of one regiment of British cavalry and two regiments of native cavalry at other parts of the station, had nothing approaching this number of cases, and there was, I believe, not a single death from the disease amongst any of these during that period. Another noticeable feature concerning this series of cases was that almost the whole of the mortality referred to occurred during the hottest and most trying season of the year immediately preceding the "rains." After that, though there was no diminution in the number of admissions to hospital for the disease, there was yet a very marked decrease in the death-rate.

Almost every case I met with in the course of over four years in India was in Australian horses. I can recall a few cases in Arabs, but none in native country-bred animals. This is exactly in accordance with Captain Williams's experience [4], also with that of Dr. Theiler, who, at any rate up to the year 1903, found that animals born and bred in South Africa appeared to be immune to the disease [12].

It would not seem that a horse's "condition" has any bearing on the disease. It may be met with in freely-fed, well-nourished horses doing little or no work; it occurs in horses in poor condition, and the greater number of cases encountered by the writer were amongst normal horses in ordinary working condition.

Clinical Characters, Course, and Diagnosis.

The disease is ushered in with the usual evidence of malaise common to febrile diseases of every description, attention being drawn to the patient by his appearing dull and listless and being off his feed. There may or may not be elevation of temperature, but such elevation, if present, may at this early stage range from 1° to 5°. There is probably some increased frequency of the pulse and respirations, and the conjunctiva is likely to be hyperæmic; but there are at present no indications whereon a diagnosis can be based, unless microscopic examination of a blood-smear should show pyroplasmata to be present. This period of indefinite illness may continue from two to three days, though the following day some degree of fever may be pretty confidently expected, if not already present, and, as a rule, within two to three days, or possibly less, of the first indication of illness, a yellow discoloration of the conjunctiva or buccal mucous membrane becomes noticeable. Some writers affirm that "the attack is sudden and manifested by a marked rise of temperature." This may be so, but to make such an assertion as though it necessarily applied to every case is apt to be misleading. For one thing, such a question depends largely, as is obvious, on the period at which the skilled observer is called in. The horse may have been "ailing" for some days before he is clinically examined, in which case he is by that time very likely to have a high temperature and possibly discoloured mucous membranes, though one should hesitate to regard this as indisputable evidence of "sudden attack." A combination of the two clinical signs just mentioned (*i.e.*, icteric mucous membranes coupled with a rise of temperature) is generally sufficient to warrant a diagnosis of pyroplasmosis in countries where the disease is known to prevail, and they are the only indications that can be described as diagnostic. There are, of course, additionally, various other manifestations of

ill-health, such as are common to all pyrexial illnesses. The pulse and respiration are disturbed; there is dulness, anorexia, staring coat, and generally more or less constipation, though diarrhœa occasionally sets in.

The disease exhibits every degree of virulence, and runs a very variable course. The attack may be very slight and evanescent, the horse showing little or no disturbance in health at all [2]. The attack may be short and sharp, lasting only two or three days, when a rapid convalescence commences. Or, again, it may be long and protracted (several weeks in duration), associated with much emaciation and asthenia, and finally end either in recovery after a long convalescence or in the onset of some extraneous and usually fatal complication. This, on the other hand, may ensue somewhat quickly—evidence of pulmonary implication, for instance, being occasionally apparent within four or five days of the commencement of the illness. Occasionally a rapidly fatal termination from heart failure may occur within a week.

With regard to the temperature, beyond broadly stating that it is likely to be higher in the earlier stages of the attack, it appears to follow no uniform course, a comparison of the charts[1] in a considerable number of different cases showing the curve to be entirely erratic and irregular.

As to the condition of the urine, this likewise appears to vary considerably in different cases and in different outbreaks. Theiler, writing of the disease in 1902 [5], states, ". . . in severe cases the urine is altered at a very early stage in the disease. It becomes darker in colour, and may be so laden with colouring matter that it will stain white horse-hairs or white cloth moistened with it an intense yellow." This was obviously due to bile pigment. With regard to hæmoglobin in the urine, the same authority appeared to hold that this did not appear in equine pyroplasmosis, since, in discussing the possible identity of biliary fever with bovine redwater (*Journal of Comparative Pathology and Therapeutics*, vol. xvi., pp. 102-103), he states: "The pathological appearances are also very similar, and the fact that hæmoglobinuria is not seen in horses can be explained in the same way as those cases of redwater in which discoloration of the urine is absent, viz., to a greater resistance of the red corpuscles." He no doubt, however, subsequently altered this opinion, for, writing later (*Journal of Comparative Pathology and Therapeutics*, vol. xviii., part iii.), he records twenty-four cases of animals (horses, mules, and donkeys) which were artificially infected with the disease, and in one of these it was stated that "red" urine was voided, and that spectroscopical examination showed the presence of oxyhæmoglobin. In the remaining cases of this series he makes no mention of the urine, and it seems likely that it was not appreciably altered. McFadyean states [2]: "In many of the severer cases there is, with the jaundice, pronounced hæmoglobinuria." Dale, referring to pyroplasmosis of the donkey in South Africa [6], states that "hæmoglobinuria is present in a small percentage of cases." Hutcheon states [7]: "The urine is generally high coloured; in one case that I saw it was as dark as claret." Eassie,

[1] I regret that a number of charts which were at one time in my possession are now unavailable.

describing the prominent symptoms of the disease in South Africa,[8] includes *hæmolysis as evidenced by hæmoglobinuria.* In Algeria, *a hæmoglobinuric form of the disease* is described by M. Roger.[9] Captain Williams, A.V.C., referring mainly to the disease in India, [10] says: "The urine is dark in colour, but I have never seen a case showing hæmoglobinuria." In Russia it is reported that "in serious cases the urine appears blood-stained, [11] whilst an officer now serving in the Soudan tells me that blood-coloured urine is seen in the disease in that country. In my own experience of the disease in India, I cannot recall one case of what I regarded as *P. equi* in which there was urinary discoloration of any kind, either by bile-pigment, hæmoglobin, or blood. I should mention, however, that I met with numerous cases which were diagnosed as simple jaundice, and not as biliary fever, where brown or dark red urine was a very frequent and striking feature. It was associated generally with icterus. In all these cases there was little or no rise in temperature, no general illness or systemic disturbance of any moment, and the condition readily passed off in the course of a few days. The urine frequently reacted to Gmelin's and Marechal's tests for bile-pigment. No parasites were ever found in the blood in any of these cases. I was possibly wrong in not regarding them as mild attacks of pyroplasmoses, though had I done so it would have seemed quite unaccountable and almost incredible that such essentially mild attacks should produce such a degree of jaundice that bile-pigment came to be excreted by the kidneys, whilst in the severe, absolutely undoubted, and perhaps fatal cases of pyroplasmosis, no such excretion occurred. At the same time, one is bound to ackowledge that the presence in the urine of bile pigment, hæmoglobin, or blood (or any combination of these) does occur in the disease, and there is ample pathological reason to account for it, and it is beyond the present writer's explanation why he never met with it.

One feature that is very characteristic in this disease is the condition of the conjunctival mucous membrane and the progressive changes that occur in it. In many cases, after a brief period of hyperæmia, it assumes a pale yellow colour, which gradually becomes a darker shade, until after a few days it may be of a deep orange or mahogany tint. At the same time, one or more red ecchymoses appear, and these, in a severe case, increase in size and become darker in shade, and finally appear as large purple blotches, very similar to what may be seen in purpura hæmorrhagica, but differing from this in that they are situated (probably) on a deeply bile-stained background. I have repeatedly noticed cases of this description. In other cases the conjunctiva, instead of assuming a pale yellow colour, remains of a brick-red tint, but with a faint yellow tinge, and the ecchymoses, single or multiple, may remain small, red, and unchanged. The buccal mucosa is probably a pale pink or whitish colour, with usually a varying shade of yellow—from saffron to orange—suffused through it. Ecchymoses are rarely if ever seen, the capillary vessel walls in this situation offering, presumably, a greater resistance to degenerative processes.

In severe attacks there is great depression, the patient showing every evidence of profound illness. There is often much thirst. The heart's action is always conspicuously affected. It is likely to be rapid and irregular in action, weak in systole, and the two sounds

frequently indistinguishable, the pulse being weak, irregular, small or wiry, and tensionless.

In cases that have been at all severe and which are progressing favourably after the attack, a very marked anæmia, and almost blanched appearance of the mucous membranes is frequently observed for some time after all traces of icterus have cleared up. Often too in this period there is considerable diuresis, the urine being copious, pale, and watery. There may be also a persistent œdema of the limbs.

A relapse of the disease after apparent convalescence or recovery is frequently referred to by some writers. I can recall only one such case.

With regard to detection of the causal parasite in the blood at different stages of the disease, I cannot do better than quote Theiler [12] who says that "the *P. equi* is always present in equine malaria, and can be constantly found when the blood is examined early in the disease. It is, however, not constantly present during the whole course of the disease, and it is quite possible that one may diagnose a case as one of typical biliary fever, and subsequent microscopical investigation may fail to reveal the presence of any intracorpuscular parasite." In the present writer's experience he was able to detect the parasite in a large proportion of cases where the blood was examined, but found, as Theiler states, that there was a better chance of finding it where the examination was made at an early stage in the disease.

For purposes of bacteriological diagnosis, blood smears should be taken and examined systematically night and morning, from the first moment that the smallest suspicion of the disease arises.

Differential Diagnosis.

Despite various divergencies in the signs and symptoms shown, it appears on the whole that the disease can be readily diagnosed, bacteriologically at the commencement of the attack, and clinically after a day or two's observation of the case. In South Africa one might entertain doubts between this disease and a subacute form of "horse sickness," but repeated microscopic examination of the blood would probably decide the matter within a short time. It might be readily confounded (at any rate theoretically) with an acute hepatitis, but the writer has never to his knowledge met with such a case, and there are probably many other veterinary surgeons who would be glad of further details of that disease. As to simple jaundice due to catarrh of the bile-duct or duodenum, or other causes, I believe this to be by no means uncommon, and particulars as to its clinical differentiation from the disease under discussion have been already given, whilst here too the use of the miscroscope would be of invaluable assistance as an aid to diagnosis.

Pathology.

The same pathology applies to all pyroplasmoses and to endoglobular hæmatozoal infections of every kind. The parasites having entered the blood-stream proceed to infest the red cells and take up a position within them, with the result that the cells attacked become in course of time—rapidly or gradually—broken up and disintegrated by the organism and hæmoglobin is set free in the plasma. When this

process has advanced and a large proportion of erythrocytes has become destroyed, as would occur in a severe case, the natural sequence is as follows: (1) Anæmia, or strictly speaking oligocythæmia, and (2) hæmoglobinæmia, or excess of free hæmoglobin in the blood. In consequence of the first there is malnutrition of the whole system, including the capillary blood-vessels. Of these, the walls of some of the weaker ones become degenerated and give way, and so produce the submucous and subendothelial hæmorrhages so commonly seen in the equine disease. As a result of the second (hæmoglobinæmia), jaundice and hæmoglobin in the urine are brought about either independently or combined. Their occurrence is lucidly explained by Sir Patrick Manson in the case of human malaria [13]. He points out that under ordinary conditions of physiological waste the products of the effete blood corpuscles are converted by the liver cells into bile pigment and so got rid of, and that up to a certain degree of pathological hæmoglobinæmia the liver can deal in a similar way with free hæmoglobin. It thus comes about that when this substance is free in the blood in unusual abundance the secretion and flow of bile become correspondingly increased, and when excessive, the latter is thrown back into the blood-stream, and gives rise to the icterus and bilious symptoms presented. Any further excess of hæmoglobin may be excreted by the kidneys. Manson mentions, however, another theory, though he states that the point is disputed. This is to the effect that the yellowness of the skin and scleræ seen in these malarial cases in the human subject is not due to bile pigment. the result of cholæmia from bile absorption, but to a direct tinting of the tissues by the free hæmoglobin present in the blood. This reasoning assumes that "in severe malarial fevers in which there is great and sudden liberation of hæmoglobin, more than what the liver can at once deal with, this liberated hæmoglobin pending its transformation into bile-pigment is taken up by the protoplasm of the cells of the different tissues and organs of the body, and precipitated in them in a slightly altered form. In other words, it is stored up waiting to be worked off as bile-pigment by the, for the time being, overtaxed liver, the yellow deposit being in all probability this precipitated hæmoglobin. But if the liberation of hæmoglobin should go beyond this again, and be too great and too suddenly effected, both for the excretory powers of the liver and the storage capacity of the tissues, then the hæmoglobin, little altered in composition, seeks a more speedy escape by the kidneys, and hæmoglobinuria is produced," [13], such as is found in blackwater fever in man, and in the various pyroplasmic affections of the lower animals. If this last theory is correct, and the jaundiced condition results from hæmoglobin becoming precipitated in the tissues in order to relieve the already over-taxed liver, then is not such jaundice probably augmented as well by cholæmia?

The assumptiom, apparently that the kidneys only constitute the last and ultimate means of exit for a superabundant quantity of hæmoglobin would not appear to hold good with the pyroplasmoses—at any rate, all of them. For if such were the case, then hæmoglobinuria would only occur after the onset of intense jaundice, whereas I believe it is a fact that in bovine red-water (*P. bigeminum*), hæmoglobinuria may occur without any yellow discoloration of the

membranes and tissues. In such cases it is probable that nature selects the kidneys as the primary, and not the final, means of escape for the excess of free hæmoglobin.

If the first theory is the true one, and the jaundice results solely from cholæmia, then one might readily expect to find bile-pigment in the urine. This would impart to it a very dark colour, and its presence might easily be mistaken for hæmoglobin when the urine is not tested.

In a favourable case of the disease the natural defences of the animal's system are sufficient to arrest the multiplication of the parasite and to overcome the pathological effects produced by it; the disintegrated corpuscles and their products are excreted, new ones are rapidly manufactured, and recovery ensues. In an unfavourable case various results may ensue. The animal may die from exhaustion at the end of a more or less protracted illness, or occasionally he may die suddenly from cardiac syncope in an early stage of the disease. There is almost always, as already stated, a very marked disturbance of the heart in this disease, far more than one would anticipate from the mere effects of an ordinary febrile attack, and should there exist any weakness of this organ a fatal result is by no means unlikely. There seems to be no proof as to the elaboration of toxins by the pyroplasmata, though one might reasonably suppose that they are produced, and if so they would appear to exert a particularly baneful influence on the cardiac muscle, or perhaps on its medullary centre.

A by no means infrequent sequel to equine biliary fever, especially in fatal cases, is the onset of some additional disease or extraneous complication. Of these, pneumonia (lobar or lobular), pleuro-pneumonia, or extensive pleurisy and hydrothorax, are comparatively common. I have also seen purpura hæmorrhagica and a subsequent general pyæmia in one case, and well-marked endocarditis (as proved by autopsy) in another.

Theiler has shown [12] that in a great many cases in South Africa, the blood very frequently becomes attacked during pyroplasmosis by another organism of the cocco-bacillus type. This, if not found in the blood, was always present in the spleen of horses dead from biliary fever. He has isolated this organism, and found it decidedly pathogenic for horses, but less so for laboratory animals. He found it more virulent when injected into horses under the influence of pyroplasmic infection than when injected into healthy horses; and the organism, when inoculated into horses in pure culture produced lesions similar to what are found in horses dead from biliary fever. It seems to the present writer not improbable that this cocco-bacillus is not confined to South Africa, but has perhaps a widespread distribution, and that its presence or otherwise may influence the mortality in any given series of cases of biliary fever and account for the great variation in the virulence of the disease which is experienced by different observers. I consider it extremely likely that some such double infection may have been responsible for the high mortality that I encountered in India in 1906, where evidence of a vast pyroplasmic invasion and advanced hæmolysis, in the shape of hæmoglobinuria, was wanting.

Morbid Anatomy.

There is a thin and watery condition of the blood which, on microscopic examination, is likely to show the following histological changes: (1) Oligocythæmia. Theiler shows a reduction of nearly 5,000,000 of red corpuscles per cubic millimetre on the eleventh day after experimental inoculation of a horse with the disease [14]; (2) an unusual inequality in the size of the red corpuscles (anisocytosis); (3) distortion, or abnormal forms of the corpuscles (poikilocytosis), the cells being pear or sausage shaped; (4) the presence of nucleated red cells of varying sizes, and perhaps distorted in shape; (5) mauve-tinted corpuscles (with Romanowski stain), known as polychromexia, and due to deficiency of hæmoglobin; (6) punctate degeneration of the erythocytes, in which numerous small bluish or purple-staining,[1] micrococcus-like granules appear in them. It may affect corpuscles otherwise normal, or may be present in nucleated red cells or in those showing polychromexia [2].

These changes are not directly due to the pyroplasmata themselves, but result from the hurried efforts of the bone-marrow to rapidly replace a large number of destroyed cells, identical results being seen wherever profound anæmia from any source occurs in young animals [2]; such changes are therefore not very marked in equine pyroplasmosis, but more noticeable in canine pyroplasmosis and African coast fever, where the proportion of invaded and destroyed cells is very high.

With regard to the leucocytes, neutrophile myelocytes may appear in small numbers; they are identical with polynuclear leucocytes, except that they have a single undivided nucleus. Eosinophile myelocytes may be seen; these also have a single-rounded nucleus [2].

Concerning macroscopic lesions, there is enlargement with more or less engorgement and bile-staining of the liver, the average weight of which has varied in my own experience from 15 to 25 lb.; enlargement within a wide limit of the spleen, which weighed anything from 4 to 15 lb. (this refers to average-sized horses whose liver weight, according to Chauveau, should approximate 11 lb., and spleen 32 oz.); petechiæ on the respiratory, urinary, and particularly conjunctival mucous membranes; subendothelial hæmorrhages in the peritoneal pleural, and pericardial cavities, with excess and frequently blood-staining of the pericardial fluid. These lesions were most constant, but other additional ones were by no means uncommon. Of these a small area of pneumonia, usually affecting the apices of one or both lungs, has been most frequently met with. In one case, which was typical of biliary fever in the early stages, it was found on *post-mortem* examination that the whole of one lung was involved in lobar pneumonia and completely hepatized. In this case there was also very well-marked general bile-staining of the tissues throughout the body. In four cases there was intense pleurisy and hydrothorax, the chest containing considerable quantities of purulent and highly fætid fluid with large coagula of lymphoid material, both adherent to the pleural surfaces and free in the pleuritic effusion, with occasional subpleural abscesses enclosing semi-inspissated pus of a caseous

[1] With Romanowski.

nature. In these cases it might have been supposed, on first opening the thorax, that an acute tubercular or some septic form of pleurisy was the primary and essential disease from which the animals had died; but on taking into consideration the early clinical features of the cases, coupled with the enlarged livers and spleens, and intrapericardial and other ecchymoses which were present, I came to regard the condition of the pleural cavities as a secondary complication ensuing on the primary disease of biliary fever. In another case the lungs and pleural cavities were normal, but there were ecchymoses on the pericardial and endocardial surfaces of the heart, and unmistakable endocarditis, as evidenced by general discoloration of the interior of all the four cardiac chambers, and a thickening produced by a purple fibrinous deposit on both the auricular and ventricular surfaces of the tricuspid valve.

Other lesions described by Theiler [5] include macroscopic changes in the blood. He says: "After death the blood quickly coagulates. Large colourless masses of clot are found. The serum expressed has a brownish-yellow colour, and frequently contains blood corpuscles, which subsequently collect at the lowest point and adhere to one another." This appearance, he says, is very characteristic, and he has observed it even in samples of blood taken during life, and has not seen the same in any other disease. He also mentions alterations indicative of gastro-intestinal catarrh. The lungs, he says, are everywhere spongy, and their apices not rarely emphysematous. . . . "The bronchi and mediastinal glands are swollen, gelatinous, and watery, and the lymphatic glands of the spleen, liver, and kidneys are much enlarged and beset with hæmorrhages. . . . The heart may be the seat of extensive lesions." In one case he found injection of the pericardial blood-vessels and pericarditis, and he goes on to state: "Points and spots of hæmorrhage are present on the epicardium, and there may also be gelatinous deposits in the same position. In the most severe cases one may find blood extravasation over the whole surface of the heart, under the epicardium, accompanied by gelatinous swelling of the root of the aorta and of the cardiac furrows. The muscular tissue of the heart is friable, and has a cooked appearance."

With regard to the kidneys, this authority describes them as always enlarged and anæmic, and their texture saturated with a serous liquid, the surrounding fat being sometimes similarly infiltrated. In other cases the only abnormality is anæmia. (In the essayist's experience the kidneys always appeared singularly free of naked-eye lesions.)

In a later communication [12] Theiler describes the results of *post-mortem* examination on eighteen horses that had died of biliary fever, and on five horses that had died after experimental infection with the bacterium productive of what he describes as "*sequelæ of malarial fever*" (*i.e.*, the cocco-bacillus previously referred to). The following is a rough analysis of these results: Markedly enlarged spleen was present in eighteen cases, and slightly enlarged spleen in three; enlargement of the liver in thirteen; endocardial ecchymoses in twelve; jaundiced condition of the liver in eleven; well-marked general icterus of the tissues in seven, and slight icterus in two; capsulated pulmonary abscesses in three. Amongst the lesions found on two occasions are excess of pericardial fluid, epicardial petechiæ, pneumonic patch in lungs, pleural ecchymoses, and general anæmia of the cadaver; whilst

discoloration of pericardial fluid, serous effusion into pleural cavity, pleurisy (pleura thickened and injected), and no characteristic changes, are some of those that were present in one case only.

In addition to these pathological changes, Law [15] says: "The muscles are mahogany-coloured; the spleen occasionally ruptured. The kidneys are congested, enlarged, and softened, and of a brownish-red or black colour, with circumscribed extravasations, especially in the cortex. The lungs are 'violently congested,' with many areas of blood extravasation, and they do not collapse on opening the chest. The bronchi are filled with a white froth." In what he describes as the "chronic form" he mentions effusions in the serous cavities (including the arachnoid), dropsical conditions of the head, neck, limbs, and dependent parts of the body; the lungs show hepatization and minute centres of suppuration, and other viscera may show fibroid degeneration.

It may thus be seen that in addition to considerable variations in the clinical characters of this disease, there may also be a somewhat wide divergence in the resulting lesions.

(*To be continued.*)

DEHORNING CALVES.

To prevent horns growing on young calves it is necessary that the calf should be treated not later than one week after its birth, preferably when it is from 3 to 5 days old. The agent to be used is caustic soda or caustic potash, which can be bought from the chemist's in the form of sticks about the thickness of a lead pencil. These caustics must be handled with care, or they make the hands and fingers sore. It is therefore advisable to wrap a piece of paper round each before using, leaving one end of the stick uncovered. The preparation of the calf consists of first clipping the hair from the parts, washing clean with soap and warm water, and thoroughly drying with a cloth or towel; slightly moisten the uncovered end of the stick of caustic, rub it on the horn buttons or little points which may be felt on the calf's head, first one, then the other alternately, two or three times on each, allowing the caustic to dry after each application. Be careful to apply the caustic to the horn button only. Be very careful also not to have too much moisture on the stick of caustic, as if allowed to run down on to the face it will burn the skin and make the part sore. After treatment keep the calves protected from rain for a few days to avoid dissolving the application on the horns. When the calf is 3 to 4 weeks old the caustic is of little or no use. The horns on animals of this age can be removed by one cut with a sharp knife. After the bleeding has stopped (at this age there is considerable hæmorrhage) the caustic should be applied to kill any cell life remaining at the base of the button, otherwise there may be some subsequent irregular horn growth, which is more or less a disfigurement. This is likewise apt to result if the treatment of the calf is delayed until it is one month old. The advantages claimed by advocates of dehorning are that it makes the animal so treated quieter to handle; and, there being no danger of wounds from poking, the animals can be placed in yards and fed together better, and because of this the milk supply is appreciably increased.

(*Agricultural Journal of the Cape of Good Hope.*)

Clinical Articles.

A FEW NOTES ON SOURED MILK TREATMENT IN DOGS.

BY T. F. PRIME, M.R.C.V.S., NORWOOD, S.E.

On March 23, 1909, I was called to see a bull dog, aged 10, who had had several bilious attacks; the patient had often had attacks of diarrhœa, and was most uncertain in this respect. As I found him dull and disinclined to eat, but in very good condition for a bull dog, I merely prescribed a tonic. On March 26 I received a telegram saying that the dog was very ill. I found him suffering from violent sickness and diarrhœa, refusing all food and drinking a good deal of water. The pulse was weak, temperature 100° F., tongue brownish.

These symptoms, with light-coloured diarrhœa at intervals, continued in spite of treatment till April 7. On April 8 the dog was removed to the infirmary, the journey bringing on another severe attack of diarrhœa and sickness, alternating with constipation. By this time the animal was extremely thin, having only retained two or three solid meals from the commencement of the illness. I continued various treatments without success until April 26, when he was seen in consultation by Professor Hobday.

The suggested treatment not producing any good effect, and the animal by this time being almost a walking skeleton, I had great difficulty in persuading the owner to be allowed to give soured milk a trial.

On May 7 I gave a small quantity of soured milk made by crushing one or more tablets of lactic acid bacillus and adding to warm milk, this being allowed to stand for twelve hours. The diarrhœa continued for a while with this treatment, but steadily became better coloured, and the dog eat readily from 2 to 3 lb. of cooked meat daily. He was sent home on May 28 in good condition, being lively and rapidly gaining strength. A great improvement was noticed after the second day's treatment with soured milk, to which the dog took kindly. No other medicine was given. I have also tried soured milk in three cases of bad dog typhoid, but the animals have been unable to retain it after the first or second day, and have died suddenly from severe hæmorrhage from the bowel, which is often the end of the cases. Soured milk seems likely to be of benefit in cases of stomach and bowel derangements in dogs, and especially in puppies.

A CASE OF URETHRAL CALCULUS IN A PUPPY.

BY A. W. REID, F.R.C.V.S., BROMLEY, AND FRED. W. HOBDAY, F.R.C.V.S., KENSINGTON.

On May 10 a spaniel puppy, only 4 months old, was brought to hospital suffering from a complete stoppage of the urinary secretion. The little animal was in great pain, the abdomen very much distended, and constant efforts were made to empty the bladder. Examination revealed the presence of a calculus about the size of a large pinhead, completely blocking the end of the urethra. With the stiletto of a catheter, well lubricated with vaseline, and also by the aid of a small

pair of forceps, the calculus was extracted, and by gentle manipulative pressure of the abdomen the urine was released. Relief was immediate, and with the aid of a few doses of hyoscyamin the cure was complete.

The chief interest in the case lies in the extreme youth of the patient.

RETENTION OF URINE IN CATS AND ITS TREATMENT.

BY G. H. WOOLDRIDGE AND S. J. MOTTON, ROYAL VETERINARY COLLEGE, LONDON.

We have recently had brought under observation a considerable number of cats with this condition, which is probably more common in town than country. It is comparatively rare in females. The castrated male is perhaps the most common victim, and his sedentary habits, coupled with the difficulty often experienced by a town cat when he wishes to move outside the house, are no doubt in a measure responsible for the trouble to which he so frequently falls heir, in connection with his urinary bladder. Cats of cleanly habits are more often affected than others. The well-trained cat knows only too well the penalty for micturating in the house, and, therefore, in many instances, prefers to retain his urine. Although in such cases the urine is retained voluntarily at first, a time frequently arrives when the retention is compulsory, for, owing to the increased pressure to which the bladder becomes subjected by the accumulation of urine, its walls become paralyzed.

Symptoms.—The animal becomes dull, mopes, refuses food; a urinous odour is sometimes exhaled from the skin, and he is often unable to walk. He is suffering from uræmic poisoning. Palpation of the abdomen may cause the animal to suffer great pain, and one has no difficulty in discovering the distended bladder, which, at times, may be so large as to occupy a very considerable part of the abdominal cavity. Occasionally, gentle pressure applied to the bladder, through the medium of the abdominal wall, may be sufficient to cause the expulsion of the retained urine; frequently, however, it fails, and the reason for this may not be evident. Sometimes it may be accounted for by urethritis, which is usually secondary to balanitis; while in rare cases the animal's penis has become strangulated by a fine ligature of cat's fur.

In cases where distension is slight, and where urine in small quantities is still being passed, a course of urinary antiseptics and sedatives will often lead to recovery. When the bladder is much distended and the animal is in great pain, or is already showing symptoms of intoxication, immediate relief is demanded, and the easiest manner by which the bladder can be evacuated of its contents is by tapping with a fine trocar and cannula. The bladder may be punctured on two or three occasions at intervals of a day or two, and recovery may even then follow. The urine thus removed varies much in appearance in different cases, depending in a large measure on the length of time during which the condition has existed. One may find the urine differing but little from normal urine, or it may be slightly tinged with blood, or in severe cases it may be the colour of port wine. Great care must be taken in handling cats with greatly distended bladders, for if much struggling takes place, rupture of the viscus and collapse of the patient are likely to ensue. The bladder may burst just as one is about to puncture it.

Urine may escape into the peritoneal cavity even though the bladder does not actually burst. In very advanced cases the coats of the organ have become so weak and inelastic that the puncture made by the trocar does not close when the instrument is withdrawn. The urine may even escape around the cannula in such cases, for owing to the pressure and to the weakness of the walls of the viscus, the puncture is actually stretched open.

On *post-mortem* examination one may find the bladder little affected, but in most cases there is cystitis, and this varies from slight reddening of the mucous lining to a most intense inflammation extending through all the tissues of the bladder. Urethritis is often, though not always, present; when it occurs catarrh may be observed at the end of the penis.

One of the main reasons for penning this note is to indicate the line of medicinal treatment which we have found most useful in these cases. As aforesaid, the first thing to do is to relieve the bladder, and frequently this can be done by careful pressure of the viscus by grasping the abdomen with one hand. This is especially the case in those instances where one finds just a little catarrh or gritty matter at the point of the penis, the added pressure forcing from the urethra a small plug which has been occluding it. In other cases, generally in young cats, it is necessary to grasp and remove with forceps small hairs which have by some mysterious means become entwined round the penis. If such means are not effective, one need not hesitate to puncture through the abdominal wall in the prepubic region with a fine sterile trocar and cannula, the outer wound being sealed afterwards with collodion. The after-treatment consists in the administration of a smart purgative, to be followed three times daily with tincture of hyoscyamus ℥ v. and hexamethylenetetramine gr. iii. in a little milk or water. The latter drug is a compound of ammonia and formaldehyde, and is probably the best-known antiseptic and sedative to the urinary tract. It is sold under the proprietary name of "urotopin" at a very high price, while under the chemical name it can be got at fourpence or fivepence per ounce. The action is said to be enhanced if combined with salol; consequently we frequently administer this in addition in similarly repeated doses of gr. iii. The external application of hot flannels is also very useful, and if there is any danger of collapse, brandy in doses of ℥x. to xv. may be administered. The patient requires absolute rest and quietness, and should be fed principally on milk and barley water.

OVARO-HYSTERECTOMY OF A SHEEP.

BY ASHLEY YOUNG, M.R.C.V.S., DUNMOW.

The subject, a ewe, aged 2, was brought to me by the farmer with the history of dystokia, having been in labour for some hours with no result. Nothing was presented, and upon examination I discovered that the os uteri was firmly closed and scirrhous.

With the owner's consent I decided to operate, incising the skin of the abdomen for about 10 in. on the right side, high up in the flank. The skin having been carefully prepared by shaving, by antiseptics and cocaine anæsthesia, I selected the right side, as I found that to be the

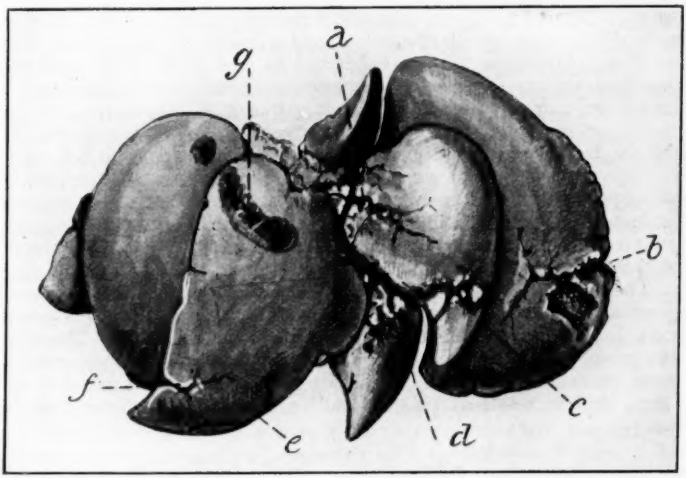
most convenient, and out of the way of the rumen. I placed the uterus which contained two dead lambs, on a boiled sheet, and removed the whole lot intact, after the application of strong ligatures above the ovary and just on the inner side of the os uteri. The skin and muscles were sutured with silk separately, and the wound treated antiseptically. This healed almost completely by first intention, and, with the exception of the formation of a small pocket of pus in its lowest part, gave no after-trouble.

The ewe was fed on milk for a week and soon picked up, becoming quite bright and cheerful, and eventually being returned to the owner.

RUPTURE OF THE LIVER IN A PUPPY.

BY FRED. HOBDAY, F.R.C.V.S., KENSINGTON.

THE illustration here depicted shows well how small an accident may be enough to cause death. The subject was a fox-terrier puppy, only 8 weeks old, whose body was brought to hospital by the owner, with a request that a *post-mortem* examination should be made to demonstrate, if possible, the cause of death.



Showing the rupture in the liver tissue. The various letters show the sites of rupture.

The only history given was that the dog had clumsily jumped down from a sofa, had fallen over, becoming dull and out of sorts shortly afterwards, and dying quietly in about an hour. The visible mucous membranes were pallid, and there was a suspicion of internal hæmorrhage.

Post-mortem examination revealed a quantity of blood in the abdomen, and several ruptures in the liver tissue, as shown in the sketch. The chief point of interest is that the cause was such an apparently trivial one for such a dire result, and the sequel also shows the value of a *post-mortem* examination.

THE CLINICAL DIAGNOSIS AND TREATMENT OF SCLEROSTOMES IN FOALS.

BY CHIEF VETERINARY-SURGEON BOCHBERG.

THIRTY-EIGHT out of a hundred foals were affected with sclerostomes. The animals before death staggered about, drooped their heads greatly, showed slight fever, or subnormal temperature, stinking diarrhœa, and died without a death struggle. From the end of August to the middle of October they were out on dry stubble day and night. They were driven up to water. The same water was given to foals and horses not grazed on this stubble without their being ill. About fourteen days after bringing the foals up the disease broke out. The foals fell ill one after the other, until thirty-two, exclusive of those that died, were affected. Of these thirty-two twelve were very ill, five moderately, and fifteen slightly.

In the twelve badly attacked the following symptoms were shown: The conjunctivæ were injected, and in some cases tears flowed from them; pulse regular; breathing laboured; no cough; bad appetite; water taken frequently in small quantities; high fever; belly tucked up and circumference lessened, and pain on pressure; no colic, but violent diarrhœa; slight peritonitic appearances and great falling off in condition through diarrhœa and somnolence; stinking, thin, pulpy diarrhœa; *Strongylus tetracanthus* found in the dung, short and hair-like, and about 10 mm. long; sclerostomes adherent to the walls of the rectum; urine frequently voided, but normal in colour.

On *post-mortem*, cæcum and colon showed necrotic changes. The intestinal wall was greatly swollen; knots in the submucosa of the intestine showed *Sclerostomum bidentatum* inside them. In the intestinal contents and wall there were numerous examples of *S. tetracanthus*. Professor Casper, to whom the organs of one foal were sent, found numerous knots under the peritoneum containing *S. armatus*. The first foals that died were treated with creolin tannin and ichthargan.

The thirty-two foals that recovered were treated with atoxyl with a quick result, and all recovered, though very ill. After daily injections, living sclerostomes soon disappeared from the dung. The atoxyl was given partly intravenously and partly subcutaneously in large doses, increasing from 0·2 gm. to 0·5 gm. in individual patients up to 1 gm., and in one foal 1·5 gm. was reached. The commencing dose was:—

℞ Atoxyl ... ...
Sod. chlor. pur. ... } āā gm. 0·2
Aqua. distill. ... ... gm. 20·0
M. f. sol. For subcutaneous and intravenous injection.

A ten days' table of temperature, pulse, and breathing is given. At the commencement of this illness none of the patients took food, and they had to be kept alive by gruel and red wine, &c.

(*Zeitschrift für Veterinärkunde.*)

Abstracts and Reports.

A PRACTICAL DEMONSTRATION OF A METHOD FOR CONTROLLING THE CATTLE TICK.[1]

BY W. D. HUNTER AND J. D. MITCHELL, BUREAU OF ENTOMOLOGY, WASHINGTON.

INTRODUCTORY.

THIS circular deals with a demonstration, carried out by the Bureau of Entomology under absolutely practical conditions, of a method for controlling the cattle tick. It is believed that equally successful results can be obtained by any cattle raiser. Exactly the same method as that of this demonstration can be followed throughout the tick-infested portion of Texas, in which are found three-fifths of all the cattle below the quarantine line. Moreover, with slight modifications, the plan pursued could be applied to any farm in the quarantine area.

This demonstration was conducted in Victoria County, Texas. The object was not so much to exterminate the tick as to bring it under control and avoid as far as possible the dipping of cattle, which causes a heavy expense to the cattle producers in Texas and elsewhere. Under present conditions in the southern portion of the tick area, the individual ranchman as a rule does not desire to eradicate entirely the ticks from his ranch. The result of complete extermination of the ticks, of course, would be the production of nonimmune cattle that would become sick upon being removed to any locality where they would be infested with fever ticks. Unless numbers of ranchmen join together to exterminate the pest over large areas, the individual would at present much rather attempt control than eradication. This is a present, practical side of the question of great importance. Of course, all intelligent ranchmen are heartily in favour of the plan of total extermination that is being very successfully followed by the Bureau of Animal Industry of this Department, namely, by gradually lowering the quarantine line. The means of control described herein are chiefly of value in regions which naturally cannot be reached by that plan for some years. Moreover, the means recommended will greatly assist in absolute eradication when the time comes.

PLAN.

It has been known for a long time that pastures will become free of fever ticks when cattle are kept out for a certain time. This is due altogether to the fact that these ticks can live and develop only on cattle and on a few other animals. In the absence of cattle (also horses, mules, and sheep) they must perish after a certain time. These facts are taken advantage of in the so-called rotation or starvation system of controlling or eradicating ticks. This system was brought to perfection by Professor H. A. Morgan, now Director of the Tennessee Experiment Station, as a result of many years of study of the tick and experimentation while he was connected with the

[1] Bureau of Animal History.—Circular 148.—A. D. Melvin, Chief of Bureau.

[2] The cattle tick, under very exceptional conditions, may develop on the dog. This is of only remote practical importance. For a discussion of this matter see Bulletin 72, Bureau of Entomology, United States Department of Agriculture.

Louisiana State University and Agricultural and Mechanical College and Experiment Station.

Location of Demonstration Pasture.

In a pasture of about 30,000 acres belonging to Mr. J. J. Welder, located in the north-eastern portion of Victoria County, an area of about one mile square was selected for the demonstration. A corner of the pasture was cut off by building approximately two miles of fencing, giving an area of approximately one square mile. Purposely, this small pasture was located in the most brushy and, according to Mr. Welder, who has owned the pasture for many years, the most "ticky" part. It was decided to make a severe test; to control the ticks, if possible, where they were known to be most numerous, Approximately one-fourth of the area selected was covered with live-oak runners, post oaks, and black jacks. The grass was not considered good, being largely sedge, which is not devoured readily by cattle. It was not burned during 1907. A well and a windmill were located in the area, so that the cattle were not compelled to leave for water.

Details of Demonstration.

The fence was finished July 25, 1907. On that date the cattle were all removed from the demonstration pasture, the gate was locked, and the key given to an agent of the department. On December 12, 1907, that is, one hundred and forty days after the cattle were removed, sixty-five head, mostly grade Durhams, were taken without selection from the herd in the main pasture, dipped in a vat filled with a proprietary "tickicide" on the same day, and then placed in the demonstration pasture. These sixty-five head remained without disturbance throughout the winter and spring of 1908. In June Mr. Welder examined those in the demonstration pasture. As shown by his statement, herinafter quoted, he was inclined to believe that the ticks had been exterminated. However, on June 26, Mr. Mitchell examined each one of the sixty-five cattle carefully, and found a total of seven ticks. These were on four animals; that is, sixty-one animals did not have any ticks whatever. Of the four animals which showed ticks, one had three on the dewlap, one had two on the escutcheon, one had one on the dewlap, and one had one on the flank.

At the time of the examination just referred to, Mr. Welder found the ticks so numerous on the cattle in the main pasture that he immediately gave directions for a general dipping. The outside cattle were heavily infested; no animal was free of ticks, and some of them were so excessively infested that from a distance they had the appearance of being mangy. At the same time the following of the starvation plan had reduced the number of ticks in the demonstration pasture to a negligible quantity. It would not have been necessary to dip any of the cattle if they had been as free from ticks as those in the demonstration pasture.

The results of this demonstration from the standpoint of the owner, a large and successful cattle raiser in Texas, are given in the following letter:—

"Mr. W. D. Hunter, Dallas, Texas.

"Dear Sir,—The experimental pasture was located in a portion

of my pasture, in the north-eastern part of Victoria County, where the brush is very heavy, and where the most ticks have always been found. On visiting my large pasture recently I found the ticks were so numerous that I immediately gave orders for a general dipping. At the same time I examined the cattle in the demonstration pasture, and to my surprise did not see a single tick. Mr. J. D. Mitchell, however, informs me that after examining each one of the animals he found a total of seven ticks on the sixty-five head. I am greatly pleased with the result of the experiment, which I consider is of great value to cattlemen. If I had had a double fence around the experimental pasture, I believe that no ticks would be found in it at this time. I believe that the few found on the cattle came from ticks dropped along the fence. Moreover, if all my cattle were as free of ticks as those in the demonstration pasture at this time, I would not be put to the expense of dipping.

"Victoria, Texas, "Respectfully,

"*June* 30, 1908." "J. J. WELDER."

It was the opinion of both Mr. Welder and Mr. Mitchell that the condition of the cattle in the demonstration pasture was excellent. Nevertheless, there was not a great difference in condition between the inside cattle and outside cattle on June 26. Undoubtedly this condition would have been changed in favour of the cattle in the demonstration area in a short time, on account of the development of the ticks on the outside cattle. Moreover, it is to be noted that the grass in the demonstration pasture was not burned during the summer of 1907, while that in the main pasture was burned. This improved the forage for the outside cattle, and made the grass on the demonstration pasture much poorer. The grass there was not burned for the reason that it was desired to do nothing toward controlling the ticks except the starvation process. The burning of the area would have complicated matters and made it impossible to determine how much effect was due to the fire and how much to starvation. As a matter of fact, the burning of the outside pasture undoubtedly destroyed numbers of ticks, and thereby made the test the more severe.

GENERAL APPLICATION OF RESULTS.

It is considered by the Bureau of Entomology that this demonstration is of great practical importance. The results can undoubtedly be applied, with slight modifications, to all the conditions under which cattle are raised in the South. It will be noted that the process of dipping was a necessary part of the plan. This would not generally be a handicap, however, since dipping-vats have been put up, or are being put up, by the majority of the large ranchers in Texas. On a small scale hand greasing or spraying the cattle would serve the same purpose as the dipping in the present case.

The results of this demonstration are more striking on account of the peculiar conditions as regards ticks that obtained in Texas during the winter and spring of 1907-08. On account of very dry weather during the summer and fall of 1907, the numbers of ticks were reduced everywhere in Texas to far below the normal. This general reduction probably makes the contrast between the cattle in the demonstration pasture and outside less than it would be under normal conditions.

With the usual number of ticks the infestation outside would have been much heavier in June than it was, and it probably would have been necessary to dip the cattle at least as early in 1908 as was done in 1907, which was about May 20.

The question might be raised as to where the few ticks found on the cattle in the demonstration pasture could have come from. It is the opinion of Mr. Welder and the writers that these few ticks were the progeny of individuals which were dropped by the outside cattle near the fence, which crawled up the fence posts and thence were taken up by the cattle on the inside. The building of a double fence would have eliminated such a contingency. Nevertheless, as already pointed out, the plan of the demonstration was on an absolutely practical basis. Under usual ranch conditions the building of a double fence would be impracticable.

The question will probably occur to the reader as to the length of time it may be necessary to keep cattle out of any certain area to reduce the ticks to an inconsiderable number. The time the pasture was free of cattle in this demonstration was one hundred and forty days. It was assumed that some of the cattle might have dropped ticks on the day they were removed. Therefore, it was desired to determine how long seed ticks from eggs deposited by an individual dropped at that time could have lived. This was done by placing engorged ticks in glass tubes about the time of the removal of the cattle, August 1. The ticks used in the experiment lived for one hundred and twenty days, none being found after November 29. To be on the safe side, twenty days were added to this period, making the one hundred and forty days during which the cattle were kept from the demonstration pasture.

WHAT TO LOOK FOR IN A BROOD SOW.

It is not such a difficult thing as might be expected to go into a piggery with a large number of the usual cross-bred and mongrel sows, and pick out the sows which produce the best litters. Milk production and general maternal capacity are associated with certain characteristics in pigs as in dairy cattle, and a little study of type in pigs will enable anyone to pick out the most profitable sows to use for breeding purposes. Before indicating what to look for, it might be as well to state that there should be no second look at the pretty little sow. She is a charming, picturesque animal, round and beefy, small points, and fine bone, just the sort of pig to make a carcase butcher glad, and such is her best destination. In the breeding pen her litters will be small, her milk secretion will be light, and her progeny will not develop with the intensity of vigour which is the best thing to drive pigs to a profitable death. The refined Berkshire is a good illustration of this type, and should be avoided in the breeding pens. It will be found that in most instances the sow which is the very antithesis of this is the best parent. Her body is long, deep, and comparatively narrow. It should be remembered that the digestive organs of the brood sow play, perhaps, the most important part in her career. They are called upon to do more work at certain times than the digestive organs of any other animal, and the success of her litters

is largely determined by the amount of food which they can make ready for conversion into milk. Hence it is that length and depth in the body are exceedingly important features in a sow for breeding purposes. The next thing to look for is a well-formed udder, free from badly developed patches or calloused parts. The phlegmatic, sleepy sow is to be avoided. Good mothers are generally somewhat nervous, like dairy cows. Milk secretion has been proved to be largely a nervous function, and the dull, somnolent sow is seldom a mother of high order. A good backline is a useful point. Hollowed backs are not safe; they should at least be level, and, if slightly arched, so much the better.

Many, when choosing sows, avoid those coarse in their points, but this is a mistake, for the type of sow referred to is generally somewhat coarse about the head and long about the legs. The latter point is a good one, for, unless such a sow had longish legs it would be found that as she approached farrowing time her udder would become chafed and sore from contact with the ground. The best brood sows will generally be found to be "clean" in the jowl and shoulder, their head, neck, and shoulder suggesting those of the Jersey cow. It is thus seen that the sows recommended for breeding purposes are not the least like the animal which they are required to produce for the butcher; indeed, they may be said to be the opposite type. Consequently the boar should be a good specimen of the meaty type, like the Berkshire. It will be found that the offspring take after the sire largely in external form, and the vigour, constitutional strength, and digestive capacity of the mother will be inherited to the resultant benefit of the breeder.

(*Western Australia Journal of Agriculture.*)

OSTEOPOROSIS—THE MINERAL CONSTITUENTS OF FOODS.[1]

BY HERBERT INGLE, B.SC., F.I.C., F.R.S.S.A., F.C.S., LATE CHIEF CHEMIST, TRANSVAAL DEPARTMENT OF AGRICULTURE.

THE importance of a well-balanced ration in feeding animals has long been recognized, and most intelligent stock-keepers pay some attention to the albuminoid ratio of the foods they use. That the requirements of animals with respect to the proportions of albuminoids or "flesh-formers" to fats and carbohydrates or "heat-formers" in their diet vary with circumstances is also realized by many, and proper attention is paid to this in framing rations for various animals kept under different conditions. But beyond the general and vague belief that the food should contain a sufficient amount of "ash constituents" or "bone-formers," little consideration has been given to the diet of animals with respect to its mineral constituents.

The author has recently been investigating from a chemical aspect a disease of the bones of horses, donkeys, and mules, which is particularly prevalent in South Africa, and from a consideration of the results obtained has been led to a theory which, he ventures to think, may account for the prevalence of the disease in that country, and

[1] From the *Tropical Agriculturist.*

may indicate means for its prevention, or at least amelioration, and at the same time furnish points worthy of consideration by all interested in the feeding of animals. The disease in question, osteoporosis, is characterized by an extraordinary weakening of the bones, and is the cause of considerable losses among stable-fed horses and mules.

In 1905, the writer examined the bones of a considerable number of horses, mules, and donkeys. The bones were merely numbered, and he was not informed which were from diseased and which from healthy animals. When the analyses were finished he found it possible to accurately divide the bones, from their chemical composition, into those from healthy and those from diseased animals. Those from diseased animals were much richer in organic matter and poorer in ash than those from healthy animals. The most conspicuous difference was shown by taking the ratio of nitrogen (which is a measure of the nitrogenous substance—ossein—present) to ash in the bones, as the influence of the very variable fat present was thus eliminated. The value of this ratio was found to vary in the case of diseased animals from 1 : 9·8 to 1 : 11·7, the mean value being 1 : 10·8; with the healthy animals the ratio varied from 1 : 13·5 to 1 : 15·6, the means being 1 : 14·37. In the bones of healthy animals the mean amounts of lime and phosphorus pentoxide were 32·28 per cent. and 21·41 per cent. respectively, while with the diseased bones the figures were 28·50 and 19·06 per cent.

In tabulating the results and considering the possible causes which might tend to produce such a condition of the bones, the author was led to the conclusion that the peculiar diet of working animals in the country—a ration composed wholly of cereals, either oat-hay or oat-hay and "mealies" (*i.e.*, maize or Indian corn)—might possibly account for the frequency of the disease in South Africa.

Some veterinary surgeons ascribe the prevalence of the disease to deficiencies of the foodstuffs in lime and phosphoric acid, while others are persuaded that the disease is caused by a specific micro-organism and is of an epidemic character, though no organism has been found, nor can the disease be transmitted by inoculation or administration of diseased bone. Now the proper ratio of phosphorus pentoxide to lime in the food of animals, in order to favour bone formation and renewal, has not been directly determined, but may be deduced from one or two considerations. Thus, the milk of animals may be assumed to contain these ingredients in proper proportion for the needs of young animals. Cows' milk contains on the average about 0·17 per cent. of phosphorus pentoxide and 0·15 per cent. of lime, *i.e.*, in the ratio of 100 phosphorus pentoxide to 89 of lime. In the bones of animals the two substances are present in the ratio of about 100 of phosphorus pentoxide to 150 of lime.

According to Rothamstead experiments, the amounts of the two substances present in 1,000 lb. of the whole bodies of animals are as follows:—

	Phosphorus pentoxide	Lime	Ratio
Fat calf	15·35	16·46	100 to 108
Half fat ox	18·39	21·11	100 ,, 116
Fat lamb	11·26	12·81	100 ,, 114
Store sheep	11·88	13·21	100 ,, 112
Store pig	10·06	10·79	100 ,, 107
Fat pig	6·54	6·36	100 ,, 95

Remembering that some of the phosphoric acid of the ash is present in the food in the form of organic matter, and is utilized in the animal in the formation of tissue other than bone (*e.g.*, brain) and to a greater extent than lime, it may probably be assumed that the food of an animal should contain about equal parts of phosphorus pentoxide and lime in its ash.

In the two substances which form the staple diet of horses and mules in South Africa—oat-hay and mealies, lime and phosphorus pentoxide are present in the ash in the following proportions;—

	Phosphorus pentoxide	Lime
Oat-hay	100 ...	77
Mealies (maize grain) ...	100 ...	4

These are calculated from the ash analyses of Wolff. In South African-grown oat-hay, I find that both the lime and phosphorus pentoxide present are smaller than in the average of European samples, and that on the average the ratio is 100 to 51. From the figures given by Warington for the lime and phosphorus pentoxide in the whole of the oat-crop, the ratio is 100 to 60.

It is evident from the above figures that the usual South African diet for working animals does not supply lime and phosphorus pentoxide in the proportions which we have adduced reasons for believing are best adapted for the nutrition of bone. On the contrary a ration consisting of oat-hay and mealies provides a large excess of phosphorus pentoxide over lime.

As to the injurious effect of the prolonged use of such a diet upon horses and mules, we have no records of direct experiments having been made, but in 1891 Weiske experimented with rabbits on these lines. Adult rabbits, from the same litter, were divided into four lots and fed for three months upon: (1) Hay. (2) Mixture of hay and oats. (3) Oats alone. (4) Oats to which sodium dihydrogen phosphate was added (so as to increase artificially the ratio of phosphoric acid to lime in the food).

It was noticed that the urine of rabbits of lots 1 and 2 was alkaline, while that of lots 3 and 4 was strongly acid. At the end of the period the rabbits were killed, weighed, and their skeletons cleaned and weighed.

The results were as follows, the weights being grammes:—

Lots	1	2	3	4
Weight of bodies	2,430	3,420	2,030	1,810
Weight of skeletons	87·66	115·80	69·28	63·76

The bones of lots 1 and 2 were heavier, stronger and richer in ash than those of lots 3 and 4. Those of lot 4 were very thin and breakable, and contained a smaller proportion of lime and phosphoric acid than the others.

In a later paper (1894), Weiske records experiments in which the effects upon the bones of animals feeding upon oats alone were successfully neutralized by the addition of carbonate of lime to the diet.

Another point of importance may be here pointed out—the erroneous idea that bran, which is almost universally regarded as being particularly rich in "bone-forming material"—*i.e.*, ash—is useful

in adding bone formation. From the point of view now under consideration, bran would be a particularly bad food, as the ratio of lime to phosphorus pentoxide is extremely low—the actual proportions present being approximately 0·3 per cent. of lime to 3·3 per cent. of phosphorus pentoxide, or in the ratio of 9 to 100. This is confirmed by the occurrence of a bone disease, known as "bran rachitis," "bran disease," or "miller's horse rickets," which is observed in animals fed largely on a bran diet. It is thus evident that, whether osteoporosis be due to a specific organism or not, a condition of the bones of animals similar to that which results from the disease may be induced by the use of a diet containing a low ratio of lime to phosphorus pentoxide.

It may be well to give a table showing the ratio of lime to phosphorus pentoxide in the ash of some typical foods. Ignoring for the moment the actual quantities of these constituents and giving only the ratios in which they occur, the following table has been prepared from analyses of average samples as given by Wolff and Warington :—

THE MINERAL CONSTITUENTS OF FOOD.

Food-stuff	Phosphorus pentoxide	Lime	
Lucerne hay	100 ...	478	(Wolff)
Crimson clover hay	100 ...	445	,,
Red clover hay	100 ...	361	(Warington)
,, ,, ...	100 ...	359	(Wolff)
Meadow hay	100 ...	262	(Warington)
,, ,, ...	100 ...	247	(Wolff)
White clover hay	100 ...	227	,,
Oat straw	100 ...	181	,,
Oat grain	100 ...	16	,,
Oats (whole plant, green)	100 ...	77	,,
Oats (,, ,, ripe)	100 ...	62	(Warington)
Barley (whole plant)	100 ...	44	,,
Mealies or maize (grain)	100 ...	4	(Wolff)
Wheat bran	100 ...	9	,,
Linseed cake	100 ...	24	,,

While the following are the ratios calculated from our analyses of South African-grown produce :—

	Phosphorus pentoxide	Lime
Oat hay (Malmesbury, Cape Colony)	100 ...	23
,, (Middleburg, ,, ,,)	100 ...	57
,, (Harmon, ,, ,,)	100 ...	65
,, (Magaliesberg, Transvaal)	100 ...	44
,, (Pretoria, ,,)	100 ...	62
,, (Potchefstrom ,,)	100 ...	53
Mean ...	100 ...	51
Rhodes grass hay (*Chloris guyana*)	100 ...	250
Sweet grass hay (*C. virgata*)	100 ...	139
Boer manna hay (*Setaria italica*)	100 ..	94
Blue grass hay (*Andropogon hirtus*)	100 ...	168
Teff grass hay (*Eragrostis abyssinica*)	100 ...	125
Veld hay (mixed grasses)	100 ...	320
Teosinte hay (*Euchlæna mexicana*)	100 ...	203
Golden millet hay (*Setaria* sp.)	100 ...	88
Californian green moha (*Setaria* sp.)	100 ...	137
Broom corn millet (*Panicum crus-galli*)	100 ...	174
Lucerne hay (*Medicago sativa*)	100 ...	431
Cow-pea hay (*Vigna catjang*)	100 ...	248

	Phosphorus pentoxide	Lime
Velvet bean hay (*Mucuna utilis*)	100 ...	581
Maple pea hay (*Pisum arvense*)	100 ...	202
Meali stalks (*Zea mays*)	100 ...	136
Kaffir corn stalks (*Sorghum*)...	100 ...	100
Millet stalk	100 ...	67
Oat straw	100 ...	209
Wheat straw	100 ...	250
Tall fescue grass (*Festuca elatior*)	100 ...	258
Burnet green (*Poterium sanguisorba*)	100 ...	485
Sheep's parsley (*Petroselinum sativum*)	100 ...	312
Prickly pear "leaves" (*Opuntia ficus indica*) ...	100 ...	1,260

There can be little doubt that animals may be gradually accustomed to live upon a diet that is at first unsuited to their requirements, and I have every reason to believe that the South African-bred horse is less liable to succumb to osteoporosis, or to suffer from deficiencies in the composition of the ash of his food, than are imported animals.

Interesting accounts of outbreaks of osteoporosis among imported horses, donkeys, and mules in 1898 and in 1904 at the military camps of Wynberg and Middleburg, in Cape Colony, are given by Captain Lane, who particularly noticed the improvement effected in the diseased animals by a change in diet from oat-hay, mealies, and bran to one containing lucerne, green forage, and bone meal. These cases afford strong confirmation of the success of the treatment which the theory here adduced would indicate as beneficial, though the treatment was adopted rather with the object of increasing the amount of both phosphoric acid and lime in the food, than of increasing the ratio of the latter to the former (which indeed was, in my opinion, the cause of its success).

It will be seen from the above considerations that the writer is of opinion that it is not the poverty of South African-grown produce in lime and phosphoric acid (as compared with European-grown foodstuffs of the same kind) which is to be blamed for the prevalence of bone troubles among animals there, but rather the practice of feeding such animals exclusively upon a cereal diet. Probably in Europe, if horses and mules were fed entirely upon oat-hay, similar diseases would result, though there is some evidence that in certain districts in Africa both the soil and the crops grown on it are poorer in lime than the corresponding crops grown elsewhere. Our analysis of Transvaal soils indicate that they are, as compared with English soils, very poor in phosphoric acid, nitrogen, and lime, but usually rich in potash.

Now, to plants, phosphoric acid is apparently more important than lime, at least so far as seed formation is concerned, and the yield of seed is often limited by the amount of phospheric acid available. In many parts of South Africa it has been the practice to attempt to compensate for the assumed deficiency in lime and phosphates of the usual foodstuffs given to animals by the administration of bone meal, and "sterilized bone meal" is largely used for the purpose. Such a practice undoubtedly tends to mitigate the evil alluded to, for we may take it that bone meal contains lime and phosphoric acid in approximately the correct proportion for bone nutrition. But to add a material containing the two substances in correct ratio to a food which otherwise is far too rich in phosphoric acid, though it improves the final ratio in the mixture, is not so satisfactory a method as the substitution for a portion of the oat-hay of a foodstuff relatively rich in lime, *e.g.*,

a leguminous fodder-crop like lucerne or cow-peas. Moreover, the mere extended use of leguminous foods would improve the rations of animals in other ways, notably by narrowing the albuminoid ratio.

In conclusion, I would urge the importance of giving due consideration, in framing rations for animals, to the amount and composition of the ash of the foods, for the supply of materials for the proper development of bone and of the mineral constituents necessary for vital processes are of as much importance to the well-being of the animals as that of proteids, carbohydrates, and fats in appropriate quantities. Where a considerable variety of foodstuffs is employed, *e.g.*, in England, the probability of much injury being done by ignoring this aspect of the question is not nearly so great as when two or three constituents only enter into the ration, but even in such cases a proper recognition of the points I have raised in this paper would probably often be useful.

The writer is fully convinced that if due regard were paid to those points, and a more varied diet were supplied to horses and mules in South Africa, there would be a marked improvement in the health and well-being of the draught animals, and that in time horses of greater weight of bone would probably be reared. Possibly the same arguments may apply to cattle, but as a rule the ox is allowed to graze and thus obtain greater variety of diet, so that its needs in this connection are probably not so great as with stall-fed animals.

(*Journal of Agricultural Science.*)

PROPORTION OF LIVE TO DEAD WEIGHT OF STOCK.

WELL-BRED and maturely fattened oxen, sheep, and calves yield from 57 to 60 per cent. in carcase to fasted live weight. Exceptionally fat oxen or sheep may yield from 64 to 68 per cent.

Generally speaking, ordinarily fattened oxen, calves, and sheep yield 8 lb. (butchers' stone) of dead meat for every 14 lb. (imperial stone) of fasting live weight.

Moderately fat pigs killed for fresh pork, including head and feet, should yield about 80 to 82 per cent. of live weight; large, well-fattened pigs sometimes yield as much as 86 per cent.

Although the weigh-bridge offers many advantages to the agriculturist in assisting him to determine the weight of fat stock, yet the proportion of live to dead weight will, in a large measure, depend on the condition of the animal, and such condition will still remain a matter of judgment.

(*The Agricultural Valuer's Assistant.*—Bright.)

Review.

THE EXTRA PHARMACOPŒIA. By W. H. Martindale, Ph.D., F.C.S., and W. W. Westcott, M.B., D.P.H. Thirteenth edition. Pp. 1,203. Published by H. K. Lewis, London. 10s. 6d. net.

It would be difficult to find more striking testimony to the usefulness of this book than the fact that it has run through twelve editions in a quarter of a century, while the demand for it, and the amount of new material to hand, have necessitated the publication of this, the thirteenth, edition. The number of pages has grown from 313 to 1,203. Very thin paper is used in order to bring the size within reasonable limits, and the result is that the book is still only "pocket size."

In this work medicines are viewed both from the pharmaceutical and medical aspect, with references to their uses. It includes both official (B.P. and U.S.P.) preparations and that very large variety of modern drugs not yet officially recognized but which have been proved to be of enormous service, and many of which will undoubtedly be included in the next edition of the B.P. Again, many of the old drugs which we have almost lost sight of are included for purposes of reference. The result is a work of enormous scope, extremely useful, instructive, and interesting. No pharmacist can afford to be without it, and those veterinary surgeons who wish to be quite up-to-date with regard to medicines would be well advised to procure a copy.

NINTH INTERNATIONAL VETERINARY CONGRESS, 1909.

THE Ninth International Veterinary Congress will be held at The Hague from September 13 to 18, 1909, in the rooms of the Sea Baths Society, Scheveningen.

TIME-TABLE.

September 13, 2 p.m., Official Opening.
,, 14 to 18, 9 a.m., General Meetings.
,, 16, 17, 2.30 p.m., Sectional Meetings.
,, 18, 2 p.m., Closing Meeting.

SECTIONS.

(1) Public Veterinary Medicine; Control of Food.
(2) Pathology and Bacteriology.
(3) Practical Veterinary Medicine.
(4) Zootechny and Veterinary Hygiene.
(5) Tropical Diseases of Animals.

SUBSCRIPTIONS.

Membership subscription, 17s.; students' tickets, 8s. 6d.; ladies' tickets, 4s. 3d. Names and addresses to be forwarded, with subscriptions, to the General Treasurer, Mr. D. F. van Esveld, State Veterinary School, Utrecht, Netherlands.

Travelling.

Members attending the Congress have the advantage of the following concessions:—

Great Eastern Railway, via Harwich and Hook of Holland (night service). Return fare, London to The Hague (for at least 20), First Class, £1 13s.; First Class boat, Second Class railway, £1 9s. 6d.

Liverpool Street ...	dep.	8.30 p.m.	daily (including Sunday).
Harwich	,,	10	,,
Hook	arr.	5.5	a.m.
Hague (Dutch time)	,,	7.2	,,
Scheveningen ...	,,	7.34	,,

This concession is made on condition that at least twenty persons travel together outwards, and if such a party is made up, arrangements will be made for the reservation of accommodation throughout the journey.

Batavier Line: London to Rotterdam (night service). Return fare, London to Rotterdam only, First Class, £1 1s. Return fare, Rotterdam to Hague, First Class, 6s. 6d.; Second Class, 4s. 11d.; Third Class, 3s. 3d.

Fenchurch Street ...	dep.	4.48 p.m.	daily (except Sunday).
Rotterdam	arr.	7 a.m.	
Rotterdam (Dutch time)	dep.	8.30 ,,	
The Hague	arr.	8.52 ,,	
Scheveningen ...	,,	9.48 ,,	

Zeeland Steamship Company, via Flushing to Hague (day and night service). Return fares, London to The Hague, at single fares (for parties of at least 20), First Class, £1 12s. 10d.; Second Class, £1 2s. 5d.; First Class boat, Second Class railway, £1 10s. 5d.

Victoria	dep.	9.45 a.m.	8.35 p.m.	
Holborn Viaduct ..	,,	9.42 ,,	8.35 ,,	
St. Paul's	,,	9.43 ,,	8.37 ,,	
Herne Hill	,,	9.55 ,,	8.48 ,,	
Queenborough	,,	11.10 ,,	10.15 ,,	
Flushing (Dutch time) ...	arr.	6.50 p.m.	5.20 a.m.	
,, ,, ...	dep.	7 ,,	6 ,,	
The Hague ,, ...	arr.	10.4 ,,	9.52 ,,	
Scheveningen ,, ...	,,	11.23 ,,	9.48 ,,	

Dutch time is twenty minutes later than English time, *e.g.*, 12 o'clock English time is 12.20 Dutch time.

Hotel Accommodation.

Prices in florins. (*Florin* = 1*s.* 8*d.*)

Scheveningen.	Bed and Breakfast.	Board.
Hotel Restaurant Alteburg...	2.50	5.50
Grand Hotel Royal	2.25 to 4, with 10 per cent. reduction	5 to 6.50
Grand Hotel Pension ...	2	4.50

Hotel des Galeries ...	... 1.50 to 2.50, with 10 per cent. reduction	5.50 to 7.50
Hotel Kurhaus Hotel Garni Hotel d'Orange Palace Hotel	... ... 3.25, single-bedded room ... ... 6, double-bedded room	

The Hague.

Hotel St. Joris ...	... 2.50 to 3	...	...	... 4.50
Grand Hotel Central	... 2.75 ...	...	...	... 6
Brugma's Passage Hotel	... 2.50 ...	...	...	... 5
Hotel de Belle Vue ...	... 2.75 to 3.50 ...		...	... 7 to 8
Grand Hotel Paulez...	... 3.30 ...	...	...	... 6.50
Hotel des deux Villes	... 3.80 ...	...	...	... 8

A Special Reception Committee has been appointed, and hotel accommodation may be secured by applying to the Secretary of the Committee, Mr. Z. Th. de Jongh van Arkel, 6, Tournooivled, The Hague.

A complete Official Programme will be issued to Members in good time before the date of the Congress.

For further information as to Congress arrangements, apply to Professor Dr. D. A. de Jong, General Secretary, 20, Maresingel, Leyden.

Intending visitors from the United Kingdom who desire to take advantage of the travelling concessions between London and The Hague are requested to send in their names to the undersigned at an early date, stating the route they prefer. Arrangements must be complete by August 13, 1909. Applications after that date must be addressed to the railway and steamship companies direct.

FRED BULLOCK,
Hon. Sec. National Committee,
Ninth International Veterinary Congress.

10, Red Lion Square,
London, W.C.

OFFICIAL NOTICE.

THE Board of Agriculture and Fisheries desire to warn all bee-keepers that an outbreak of disease, believed to be identical with the Isle of Wight bee disease, has occurred in several hives in Buckinghamshire. This disease, which has destroyed almost all the bees in the Island from which it takes its name, is due to a bacillus closely resembling the bacillus of plague, and no remedy for it is known. It is of the utmost importance, therefore, that bee-keepers should take every precaution to prevent the disease spreading, and they are strongly advised to keep a careful watch for any signs of its appearance. A full description of the disease was published in the *Journal of the Board of Agriculture* for February, 1909, and bee-keepers who find symptoms of disease corresponding to the description there given should communicate with the Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W.

Translations and Extracts.

FIBROLIPOMA IN THE SUBCUTANEOUS TISSUE OF THE LEFT QUARTER.

BY CHIEF VETERINARY-SURGEON GUHRAUER.

A SWELLING as large as a hen's egg was to be seen on the near quarter of an old remount just in front of the external angle of the haunch. The outer skin showed no changes, and was not adherent to the tumour, but was movable in all directions for about 15 cm. without the horse exhibiting pain. Rubbing in of 5 per cent. iodized vaseline gave no result. As the tumour increased in size it was decided to remove it. The skin over the place was disinfected and shaved, and a vertical incision 8 cm. long made through the skin and subcutaneous tissue. A white ball-shaped tumour came through the opening. This was cut out, and a thick connective tissue capsule enclosing a yellowish mass could be distinguished. After cutting through the capsule an almost perfectly round yellow tumour of hard consistence was got out. The thick capsule was as far as possible removed, and was flat internally and externally. Hæmorrhage from the operation was only slight. After disinfection of the wound cavity the skin was sutured and airol paste spread over. The horse was kept tied up for a few days in order to avoid the tearing out of the wound sutures by lying down. After ten days the wound was completely cicatrized.

The tumour on section proved to be almost entirely fatty. The blade of the knife used to cut the neoplasm was covered with little drops of fat. There were whitish connective tissue bands on the cut surface, and yellowish, firm, fatty tissue between them. Microscopic examination showed without doubt that this was a fibrolipoma. A tumour of this description is not rare, especially where fatty tissue exists, but the position of this one, and in a place where neoplasms rarely arise, was noteworthy. Previous to operating I had surmised a cartilaginous tumour.

(*Zeitschrift für Veterinärkunde.*)

CONTRIBUTION TO THE STUDY OF PERITONITIS IN BOVINES.

BY CASALI.

PERITONITIS of bovines is acute or chronic. As a cause one recognizes inflammations and perforations of neighbouring organs, infections, maladies, tumours, ovaritis, diseases of the liver (echinococcosis, abscess), &c. In calves peritonitis often complicates umbilical infection. In the cow it is often caused by non-deliverance and torsion of the uterus.

Diagnosis is difficult, for the symptoms have nothing special about them, and may often be confounded with those of gastritis and enteritis; moreover, abdominal exploration by palpation and percussion are of little service because of the very slight sensibility of the bovine species.

Casali describes four cases of peritonitis in the cow. The illness was caused by a hepatic abscess, by an abscess developed in the neighbourhood of the rumen (abscess by foreign body), by torsion and necrosis of the uterus, by abdominal traumatism.

The author draws the following conclusions: (1) Peritonitis of bovines is almost always of a chronic nature, and frequently follows on traumatic influence. (2) Fever is not a constant symptom of the malady. (3) Alterations of fæces (specially of their colour), anorexia, and meteorism are almost constant symptoms. (4) The presence of albumin in the urine may facilitate diagnosis.

(*Archivio Scientifico della R. Società ed Academia veterinaria italiana.*)

COMPLETE TRANSVERSE FRACTURE OF THE SCAPULA IN A DOG.

BY CIUOTTI.

A two-year-old dog returned to his owner on three legs after the passage of an automobile. The left shoulder was swollen, limp, and crepitated under the fingers, and showed abnormal mobility; the scapula is fractured transversely a little below the median line. Simple dressings were used, and after four days cold lotions with tincture of arnica, a resin bandage of Delivart's pattern was applied. Cure was complete in thirty days.

(*Il nuovo Ercolani.*)

AMPUTATION OF A POSTERIOR LIMB IN A DOG: ITS REPLACEMENT BY A FALSE ONE.

BY SCHWEIGER.

A DOG passed under an automobile which crushed the posterior right limb. The author, called, practised amputation above the tarsus, following the ordinary method. The operation wound healed normally. An orthopædist of Salzburg manufactured from a model of a healthy member a cork paw consolidated by a steel stem and fixed to the stump by a process *ad hoc*. At first the movements of the invalid were uncertain; he raised the stump and the false limb so high that he tumbled head over heels on the left side. At last everything settled down, and the dog finished by using all four limbs equally well, even for running.

(*Tierärztliche Zentralblatt.*)

RECTAL POLYPUS IN A HORSE.

BY STAFF VETERINARY-SURGEON BENGE.

FOR several weeks I was attending a privately-owned black gelding, aged 12, which had difficulty in defecating. On one occasion, before my examination, the horse had exhibited rectal prolapse three times after great straining, but the bowel had gone back. Manual

examination of the rectum showed, besides appearances of a rectal rupture, about 30 cm. from the anus on the under wall of the rectum a pedunculated painless tumour almost as large as a child's head, of doughy consistence, with rather smooth surfaces. It was movable to and fro in the rectum with the hand. The stalk of the tumour was about 15 c.m. long, three fingers thick, and it could be plainly followed to the under-wall of the rectum. The mucous membrane passing over the polypus was swollen, and greyish yellow to brownish red.

I operated on the horse in the standing position, after fastening the tail on one side and thoroughly disinfecting the field of operation; the stalk of the tumour was ensnared by an elastic ligature, and the tumour divided into two holes and cut off behind the ligature with scissors, and then shoved back into the rectum. There was no after-bleeding or straining from the operation. The horse seemed to stand the operation without exhibiting pain, made a good recovery, and went to work in twelve days after the operation. Section of the tumour showed to the naked eye a soft, jelly-like consistence and a partly yellowish and partly blood-red colour. No microscopic examination was made.

(*Zeitschrift für Veterinärkunde.*)

GENERALIZED CARCINOMA.

BY M. P. VALADE, ASSISTANT VETERINARY SURGEON TO THE 34TH ARTILLERY.

PAPE, a horse, aged 18, belonging to a gendarme, entered the infirmary on February 4, 1909. There was almost complete loss of appetite, and the subject had fallen off in condition very appreciably in a few days. Respiration accelerated, the heart-beats hurried. Information derived by auscultation and percussion of the thoracic cavity was not at all precise; all the symptoms were vague, and did not permit of a certain diagnosis. At the time infectious pneumonia was prevalent in the garrison, and it was suspected in this case. Adynamia and anorexia persisted on the 5th, and the animal died in the night without the grave affection with which it was attacked being suspected.

Antecedents.—The horse had been operated on in May, 1908, for a tumour of the tail. Sections were not taken, but the macroscopic view of the neoplasm led one to believe it was a carcinoma. Since that time the gendarme had noticed no abnormal symptoms.

Autopsy.—The carcase was well nourished.

Abdominal Cavity.—The peritoneal cavity contained about 3 litres of hæmorrhagic serosity. The large intestine and the floating colon were congested. A tumour as big as a large nut, with a verrucose surface was found in the meso supporting the small colon, and 5 to 6 cm. below its small curvature. The liver was very hypertrophied, and weighed 20 kilogrammes. Its surface was of a yellowish colour. The hepatic parenchyma was entirely invaded by a clear yellow magina of friable consistence. There was not a single spot where it had preserved its normal structure.

The spleen presented some very interesting lesions. It was tripled in volume (weight, 9 kilos.). Its pulp contained secondary

nodules, whose dimensions varied from those of a filbert nut to two doubled fists. On section these tumours had an encephaloid aspect; some of them had undergone caseous degeneration. The cortical substance of the kidneys was very friable. The right one presented, at the level of its external edge, a tumour the size of a mandarin, with texture similar to that of the nodules in the spleen. The lombo-aortic glands were hypertrophied; one of them situated at the summit of the left kidney was as large as a nut.

Thoracic Cavity.—Lungs hyperæmic; were invaded by secondary neoplasms, whose volume varied from that of a grain of maize to that of an orange. They were chiefly caseated internally. Mediastinal glands hæmorrhagic. Pericardium thickened, contained about 2 litres of a citron-coloured fluid. Myocardium degenerated; some ecchymoses on the valvular endocardium.

Histological Examination.—Histological examination of different neoplasms practised at the laboratory of pathological anatomy of the Alfort School by Professor Petit, has shown encephaloid carcinoma. There had been generalization of the disease from the tumour operated on last year—a generalization slow and insidious, as shown by the patient exhibiting no sign of illness before entering the infirmary. It would seem, however, that one may have lessened the organism, and precipitated thereby the evolution of the infection by which the subject was attacked.

Inoculation Experiments.—Two guinea-pigs inoculated in the peritoneum with material from the pulmonary tumours showed a negative result at the autopsy practised at the end of a month and a half.

(*Revue Générale de Médecine Vétérinaire.*)

TUBERCULOSIS OF THE HORSE.—TUBERCULOUS ULCER OF THE RECTUM.

BY MONS. CH. DARMAGNAC, VETERINARY SURGEON TO THE REMOUNT DEPÔT OF MOSTAGANEM.

On July 31, 1907, the horse Lutteur, No. 374, aged 9, the mount of a captain of sharpshooters, was thrown to be castrated because of a tendency to continual masturbation, which seemed to have reduced him almost to a complete skeleton. The operation, practised by torsion with a single incision (Jacoulet's procedure), was done with the subject very restless, and a hernia of the small intestine resulted, which necessitated anæsthesia, return of the bowel and the application of a clam.

The animal seemed all right from 9 o'clock in the morning to 6 o'clock in the evening; then he showed dull colic, and symptoms of acute peritonitis developed progressively and rapidly, and he died in a few hours.

Lesions. Abdominal Cavity.—The classic signs of perforating peritonitis were observed: reddish liquid holding in suspension alimentary particles, intense congestion of the two folds of peritoneum, with ecchymoses and red punctæ; some barley grains were visible on the surface of the intestinal convolutions. After attentive examination of the different regions of the intestine, a little in front of the entry of the

pelvis and at the superior part of the rectum, a narrow rent was discovered, between the lips of which particles of food could be seen.

The rectum, completely liberated from its attachments, was exposed, and opened in its entire length. It was then seen that the rupture was situated at the bottom of an ulcer on the upper wall of the rectum, about 35 cm. from the anus. This ulcer presented the following characters: elliptic in form, with its long axis antero-posterior, it was about 6 cm. by 3 cm. Its smooth borders formed an indurated hem; the mucous and muscular tunics had completely disappeared, and the depth where the rent was only formed by very fine-grained, hæmorrhagic buds subjacent to the thickened and adherent peritoneum. The glands of the small curvature of the rectum were hypertrophied, particularly those near the ulcerated region. On section they showed fine granulations, with a fibrous resistant envelope and a caseous centre.

The liver presented tubercles on its surface and in its depths. These tubercles, of nodular shape, were from a pea to a nut in size, without adherence to the hepatic tissue. They had a fibrous shell and yellowish caseous contents.

Thoracic Cavity.—The two lungs were engorged; at their surface and in their depths, tubercles varying in size from a grain of millet seed to that of a pea, and like those situated in the liver, they had a fibrous capsule and caseous contents. Bronchial glands hypertrophied, and contained miliary tubercles. Pericardium ecchymosed, and containing about 1 decilitre of yellow liquid; the endocardium of the left heart studded with large ecchymoses. Microscopic examination showed that the bacilli were rare in the different lesions, with the exception of the depths of the ulcer, in the product of the scraping of which they swarmed. Two rabbits inoculated were tuberculised. These lesions, found at the autopsy, explained the emaciated state of the animal, which had been ascribed exclusively to perversion of the genesic sense. One might ask whether this morbid tendency to masturbation observed in the subject was not due to his tuberculous state, it being a vulgar notion—wrong or right—that tuberculosis exercises an aphrodisiac action on the human organism. It would seem possible that the bacilli of tuberculosis may act likewise in certain animals.

(*Revue Générale de Médecine Vétérinaire.*)

PRIMITIVE SARCOMAS OF THE LIVER OF SHEEP.

BY BRUNERO, ITALIAN VETERINARY ACADEMY.

In July, 1905, Brunero observed four cases of sarcoma of the liver in sheep slaughtered at the abattoir of Nuoro.

(1) A sheep, aged 9, had nodules in the liver from the size of a grain of millet seed to that of a hen's egg. The liver weighed 800 grammes, and contained 254 tumours on its posterior face and 263 on its anterior face. The spleen had several tumours.

(2) A sheep, aged 9, had five tumours in the liver, which was cirrhotic.

(3 and 4) A sheep, aged 3, had several tumours in the liver, and an old sheep had two.

(*Revue Générale de Médecine Vétérinaire.*)

CURE OF A STALLION SUFFERING FROM DOURINE BY MEANS OF ATOXYL.

BY M. MONOD.

A VALUABLE stallion, Ben-Brac, fell ill in July, 1907, and was examined in the remount depôt at Constantine. No trypanosomes were found, but rabbits could be infected with his blood and trypanosomes found in these. He received 1 to 2 litres of curative serum immediately. This was badly borne, and all treatment was discarded until September 25. From this time he received, every two days, subcutaneous injections of atoxyl, beginning with 0·5 gramme, and each time rising 0·1 gramme until a dose of 1·0 gramme was reached, and the last dose was administered five times. This treatment continued from September 25, 1907, till January 8, 1908, and was well borne. The amount of atoxyl used was 33 grammes.

It has been previously stated that the serum injections were badly stood. In spite of this a favourable influence on the illness was noticed in the first fourteen days of September, but at the end of September the condition of the horse was worse. About the middle of October œdema arose, and swellings on several parts of the body; then an improvement began, and on November 25 appearances of illness could not be perceived, and on December 10 the last trace of the complaint disappeared, with a slight œdema at the sheath.

One hundred and seventy days have elapsed since the foregoing was written, without any return of the illness. It must now be ascertained whether this valuable entire still retains his good qualities as a stock-getter.

(*Bulletin de la Société Centrale de Médecine Vétérinaire.*)

NEW TREATMENT OF CANKER.

BY PROFESSOR HOFFMANN, STUTTGART (OESTERREICHISCHE MONATSSCHRIFT FÜR THIERHEILKUNDE).

THE list of so-called specifics against canker comprises almost all the drugs in the Pharmacopœia. The most varied treatment, followed by the most cruel surgical interventions, fails in the face of the tenacity of this complaint. The procedure recommended by the author rests on the two following principles: (1) Bleeding excision of all the fibrillæ under cover of antisepsis and hæmostasis, with Esmarch's bandage. (2) The application of an occlusive dressing, perfectly formed by plaister bandages, and covering the foot to the coronet. The reparative process would be theoretically due to perfect occlusion, which one cannot obtain with any other product except plaister, and above all to the healing and cicatrizing blood serum which fills up all the interstices of the operation wound and dressing, which latter is removed under Esmarch's bandage pressure.

The compact dressing thus obtained permits proliferation of reparative cells for ten to twelve days; after this time it is removed, and the classic treatment of a normal wound in process of cicatrization continued. The following precautions should be taken before operating: Wash the foot, bathe in sublimate, and apply antiseptic dressing

for twenty-four hours. Before applying the dressing, with bandages soaked in carpenter's plaister, one sprinkles the wound with compresses of formal 5 per cent. The results are be very satisfactory. The same method of compressive dressing might perhaps be advantageously employed for all wounds of the foot.

(*Revue Générale de Médecine Vétérinaire.*)

ON THE OCCURRENCE OF *HYPODERMA S. ŒSTRUS EQUI.*

BY STAFF VETERINARY SURGEON RIPS.

In the limited literature available to me the occurrence of the larvæ of the gadfly in the skin and subcutaneous tissue of the horse is only occasionally mentioned.

Dieckerhoff relates one case occurring at the same time as catarrh, and giving rise on this account to a suspicion of glanders. Fröhner mentions a case recorded by Hell in April, 1901.

I have not yet noticed the larvæ in German horses, but like Hell have had the opportunity of seeing them in English horses imported into Germany, and brought over at the end of February. In the months of April and May I could find the lumpy swellings in 20 per cent. of these horses. I have never seen them on the neck, but have frequently met with them at the anterior upper angles of the shoulder blades, on the back, over the bodies of the ribs, and on the croup. There are damp and glued parts in the hair, and hard lumps as large as a hazel-nut or walnut. Often there are swellings as big as a man's head, especially in the neighbourhood of the shoulder-blade.

If one presses the wet skin in these places more or less pus *bonum et laudabile* is discharged and a larva 10 to 12 mm. long and 2 to 3 mm. thick. Larvæ removed without incision and by squeezing leave a sharply-bounded round hole about 2 in. in diameter, similar to a punch cut. The attacked horses—thoroughbreds more than half-breds—show visible signs of discomfort before the larvæ begin to emigrate; they toss their heads and stretch themselves; even in cautious mounting by the rider thoroughbred horses especially crouch; the gait is cramped.

If the lumps are in the neighbourhood of the upper edge of the shoulder-blade, between this and the vertebral spines there is loose subcutaneous tissue and collateral œdema, which sinks later on, and causes the muscles of the anterior limbs to swell, become stiff, and show signs of inability. Horses affected in this way were rested for eight to fourteen days, but other horses could be ridden if the saddle area was not affected. On an average the larvæ disappear in four weeks.

It remains to touch on the forensic and differential diagnostic side of this question. Veterinary science, logic, and experience (Fröhner) can throw a clear light on the development history of the larvæ. Now there are in England no "truth rights" in our sense of the word, besides any objection by the buyer must be lodged within five days after the sale; so it is idle to think of this.

The better class of German buyer turns as a rule to a gentleman

seller known in England, or to such foreign buyer as may be recommended to him. I could not learn authentically from the buyers whether horses turned out in the spring and which suffer from this complaint are in a neighbourhood where the horse-biting fly (gadfly) is regionary, and if so whether this deficiency could be charged against the seller. Wind and eyes are generally answered for by a gentleman seller, and the word of a gentleman should be absolutely reliable on the above question.

(*Zeitschrift für Veterinärkunde.*)

THE TREATMENT OF MAMMITIS IN COWS WITH BORIC ACID INJECTIONS.

BY F. STRATEN-MAANEDSSKRIFT, FOR DYRLÆGER.

THE systematic treatment of mammitis by solutions of boric acid gives excellent results. A dose of 150 cc. of a 3 per cent. solution is injected. The results are as follows:—

1 case	... 1 injection	...	cure in 3 days.
8 cases	... 1 „	...	„ 7 „
5 „	... 2 injections	...	„ 14 „
1 „	... 2 „	...	„ 18 „
1 „	... 2 „	...	no cure.

In the two last cases there was an old and abundant catarrh of brown colour.

Intervention gives best results if early, and then the cure is almost certain.

(*Revue Générale de Médecine Vétérinaire.*)

Correspondence.

PROPOSED PROCEDURE FOR REMOVAL OF NAME FROM REGISTER.

To the Editors of the VETERINARY JOURNAL.

SIRS,—In your Editorial for May of this year you discuss the procedure for the removal of a name from the Register of the Royal College of Veterinary Surgeons. The discussion arose over the conviction for fraud of a certain member, and the fact that his name was not removed. You suggest an alteration in procedure, and I wish to point out that such an alteration would be *ultra vires* of the powers conferred upon the Council by the Veterinary Surgeons Act of 1881.

The procedure you propose would involve the following steps: (1) The automatic removal of a member's name on his being convicted, and a notice to him informing him of the removal; (2) an application by him to the Council for his name to be restored; (3) enquiry, consideration, and decision by the Council. Such a procedure would have been possible if the Act of 1881 had given general powers of removal to the Council. The Act of 1881, however, clearly specifies

the occasions on which the Council may order the removal of a name, and as clearly lays down the procedure to be followed.

Section 6 of the Act provides that the Council, at a meeting at which two-thirds of the members of the Council are present, and by the approval of three-fourths of the members so present, may order the removal of a name from the Register. These proportions had been laid down in Clause 12 of the Charter of 1876. The section further provides the occasions on which the Council may proceed to order removal; one of these is the conviction of a member for an offence which in England would amount to a misdemeanour or higher offence.

Section 7 orders that for the restoration of a name to the Register, the Council must so vote at a meeting at which the members are present, and vote in the same proportions as under Section 6.

Section 8 of the Act lays down the procedure: A Committee of the Council (in practice, I believe, the Registration Committee) is to ascertain the facts of the case, and report to the Council. The Council are to form their own judgment, but the findings of the Committee are to be conclusive as to the facts of the case.

It seems, therefore, clear that such an alteration in procedure as you propose could have no force without an amendment to the Act of 1881. Whether or no such alteration is required is not within my province to say. I merely wish to point out the fact that statute clearly defines what the *present* procedure is to be.

I am, Sir,
Yours truly,

4, Essex Court, Temple. ROBERT DUNSTAN.

Books and Periodicals, &c., Received.

Transvaal Agricultural Journal; Agricultural Journal of the Cape of Good Hope; Journal of the Royal Army Medical Corps; Bulletin of the Bureau of Sleeping Sickness; Proceedings of the Royal Society of Medicine; Bureau of Animal Industry (Washington); Tropical Agriculturist (Ceylon); Transactions of the Highland and Agricultural Society of Scotland; Journal of the Rat and Vermin Society; Report of the Canadian Agricultural Department, Veterinary Branch.

Letters and Communications, &c.

Mr. J. D. Whitehead; Captain Jolliffe; Mr. R. Dunstan; Mr. T. P. Prime; Mr. F. Bullock; Department for Agriculture and Technical Education for Ireland; Board of Agriculture and Fisheries; Mr. J. Gregg.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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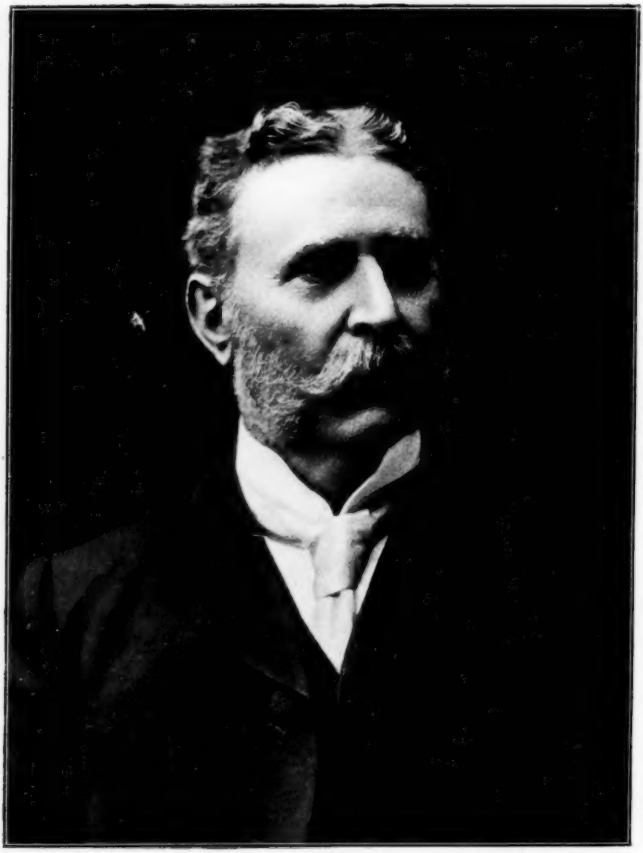

MR. SAMUEL LOCKE, M.R.C.V.S.,
President of the Royal College of Veterinary Surgeons.